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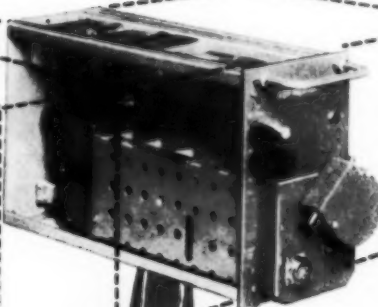
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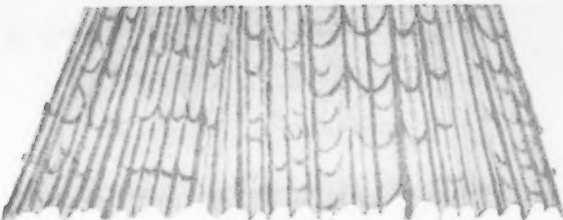
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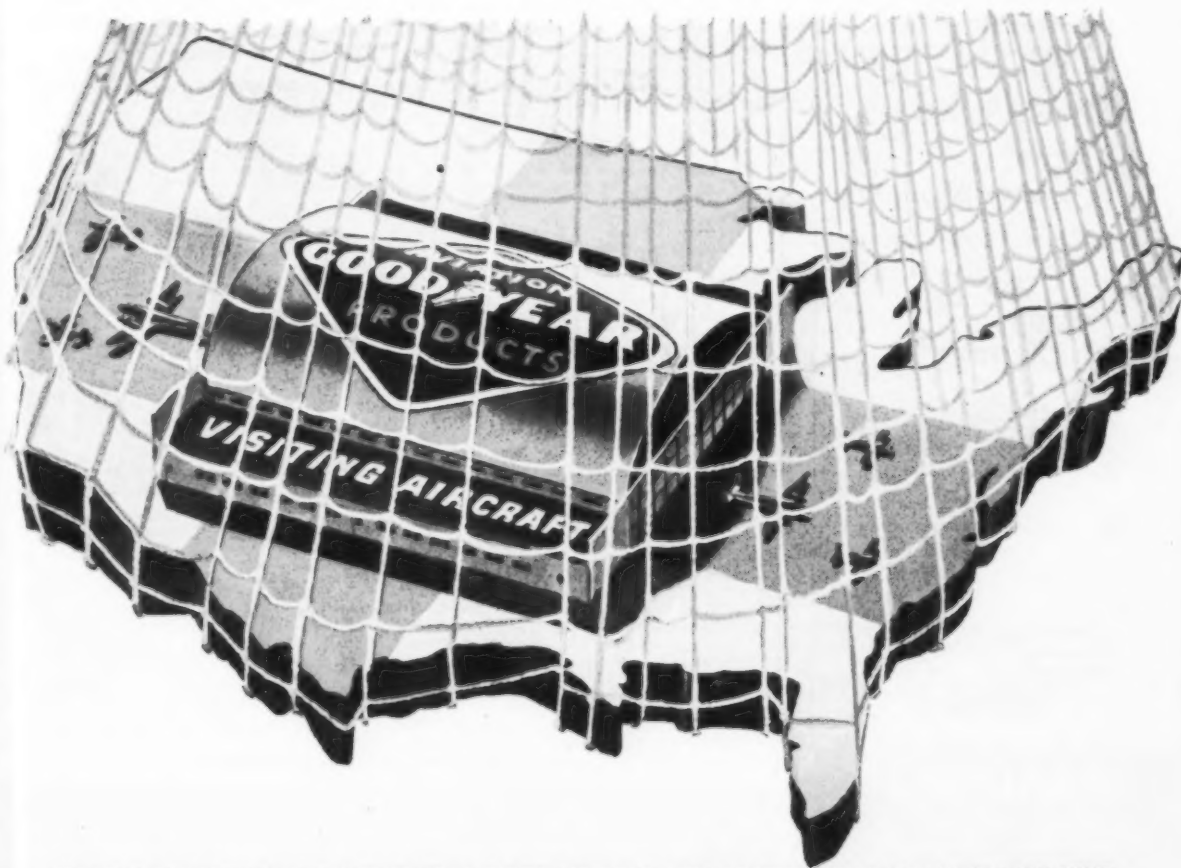
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AMERICAN AVIATION

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JUNE 4, 1956

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AMERICAN AIRLINES

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Manny Celler Is Having a Field Day

A VETERAN Democratic Congressman from Brooklyn has been having a field day investigating the scheduled airlines. Or to put it accurately, he's been engaging in a minor-league inquisitorial sport of baiting, harassing, heckling and needling.

It all started out as an investigation of alleged monopolistic practices and tendencies by the scheduled carriers. The Civil Aeronautics Board was included as a target. But the daily race card has shifted faster than the human eye can catch it. The inquiry has bounced to conspiracy, influence peddling, lobbying, airline fares, airline earnings, stifling competition, and whatever seemed to come to mind. It's far from finished.

How did it all start? Only Congressman Emanuel Celler can answer that fully. But the pattern seemed pretty well set at the very beginning. A non-sked group has been more than casually concerned with the hearings. The questions all point to non-sked origin.

Manny Celler is now 68. He was first elected to Congress in 1922. He hasn't lost an election in his Brooklyn district since. That's been 34 years. As long as he takes care of his constituents' problems he can roam at will on national issues.

Seniority counts for everything in the House of Representatives. A record of 34 years puts Manny Celler far up the ladder when it comes to all-important committee chairmanships. He would be the last to understate the power behind these chairmanships.

How far back Manny Celler aimed for chairmanship of the important Judiciary Committee is something we don't know. But he got it and now holds it as long as the Democrats control the House.

So early this year Manny Celler announced out of a clear sky that he was setting up a special subcommittee to investigate alleged monopoly practices. He retained the chairmanship. At first nobody was too much surprised because Manny Celler has announced anti-monopoly investigations before.

But this is no judicial investigation. Assisted by several Democratic colleagues and challenged only sporadically until just lately by a rather uninterested and uninformed Republican minority, Manny Celler has been hop-skipping all over the place conducting a

chivy. The heckling, the bullying, the needling, the hounding and the baiting, all wrap up into an abuse of legislative prerogatives rather than a sound inquiry.

It's all been one-sided until recently. Manny loves to launch some loaded questions about influence, pressures and lobbying pertaining to scheduled airlines. But he backs away, or tries to back away, when the table is turned to pressure campaigns by the North American (now Trans American) group. Manny Celler made a Busiris mistake when he permitted Alexander Hardy, v.p. of National Airlines, to testify. Brother Hardy is a match for any baiter. Into the record went gobs of information about North American's pressure campaigning and the big names it has used. It was painfully evident that Manny Celler was anxious to get on to another subject.

That the hearings are inspired harassment with no clear constructive object in mind became evident when officials of the Air Transport Association were called to testify. Armed with elaborate presentations, they were primed for serious discussions. But the interruptions by Manny Celler and his Democratic colleagues were multitudinous. And nine times out of ten the questions were completely irrelevant, diversionary and unrelated. It was obvious that Manny Celler was merely playing a game.

It all boils down to the fact that Congressional committees have great latitude. We would not change this. But the privilege in this nation of giving our national legislative body great latitude also includes abusive practices. Manny Celler's hearing is time-consuming, it is unbalanced politically, it is hostile to an established industry, and its direction is one of harassing expediency. It is, in short, a farce.

Manny Celler is fully aware of his power and his seniority. He never lets anyone forget it. He's been at his stand 34 years. So far he has scared the CAB into ordering a complete fare investigation. If CAB does a thorough job it will require two and a half years and cost the carriers many hundreds of thousands of dollars, very possibly into the millions. When it's completed the national economic scales will be so different as to make the fare study an historical record and nothing else. But that won't bother Manny Celler. He knows why he started the current hearings and he's enjoying the hounding.

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As the chart on the opposite page shows, all of the producing companies in the GPE Group work in highly advanced fields. GPE Coordinated Precision Technology, a basic GPE operating policy, gives each GPE company access to the skills and facilities of the others and coordinates those which are relevant. This coordination has played an important part in amplifying the capabilities of all GPE companies, enabling them to solve highly advanced technological problems with vision. Frequently, as with these AN/APN systems, frontiers of science are pushed back on the way.

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SKIN PANEL



Washington Report

Behind Interservice Wrangling

Fight among the services for airpower is only part of the reason for the big blowup at the Pentagon (see p. 27). Army and Navy are rankled at the continuing growth of Air Force and at their own dwindling budgets.

In contrast to Air Force's gain in prestige and expenditures—\$16.8 billion estimated for 1957—Army and Navy have seen their available funds cut sharply the past four years. Army will spend about \$8.6 billion in fiscal '57, against \$16.3 billion four years ago, and Navy has to be content with \$9.6 billion next year, a drop of \$2.3 billion since 1953.

Air Force today is the world's largest business. Its assets at the close of 1955, for instance, totaled \$71.5 billion, or \$13.5 billion more than the combined assets of America's 24 largest corporations.

Air Materiel Command alone controls assets of more than \$35 billion, or \$9 billion more than the combined assets of Metropolitan Life Insurance Co. and the Bell telephone system.

Annual dollar volume of AF buying exceeds the combined purchases of U.S. Steel, duPont, Standard Oil of New Jersey, A. T. & T. and General Motors.

USAF manpower totals 900,000 in uniform and 400,000 civilians—a total of 1.3 million, compared with 970,000 employed in manufacture of automobiles and 780,000 in production of aircraft.

Dilemma at ANDB

Air Navigation Development Board will need a shot in the arm to survive effectively in its present setup, in the opinion of many Washington observers.

ANDB's reputation has been anything but top-drawer since it issued a release early last year recommending immediate discontinuance of DME in favor of Tacan as the common air navigation system. And now it has lost two of its best men.

Sam Saint, a top authority on air traffic control, completed his term as a WOC (without compensation) and could not be renamed. And now J. L. Anast, head of ANDB's systems engineering group and an expert in the field, has resigned to serve as principal adviser on systems planning to Edward P. Curtis, special Presidential aide for aviation facilities.

Because of the DME-Tacan controversy, appointment of Dr. C. C. Furnas, assistant defense secretary, to succeed AF Secretary Donald A. Quarles as chairman of

ANDB has been kept an unofficial secret. This has been possible because there have been no formal meetings. Dr. Quarles has stayed in the picture to see the short-range navigation fight through to the end.

There are rumors that Col. J. Francis Taylor, now on extended leave until July 1, may be succeeded as director later this summer.

Electronics 'NACA' in Works

Watch for a proposal soon to set up a government-supported electronics organization similar to the National Advisory Committee for Aeronautics.

Reason: Pinch on information availability already is being felt as industry runs out of basic new knowledge in the field and as research capability becomes more restricted by limitations on money and facilities—except in cases of a few electronic giants.

House Committee on Government Information has been hearing testimony on problems relating to dissemination of scientific information from government agencies, and a subcommittee has been inquiring into whether present exchange of information is handicapped by unrealistic security regulations.

Out of such inquiries may come the realization that in-fact stocks of new electronic know-how are very skimpy and need bolstering for the race with Russia.

AF Support for Nike

Top Air Force officials have attempted to quiet the controversy over Army's Nike surface-to-air missile vs. AF-Navy Talos.

Said AF Secretary Donald Quarles: "I would say that the Nike anti-aircraft missile is an effective weapon . . . I can only say for the AF that we hope if we have to carry an attack against another country, it will not be defended by weapons as potent as the Nike."

Chief of Staff Gen. Nathan Twining commented: "I think the Nike weapon is the best thing we have today. It far exceeds anything we had in the standard anti-aircraft artillery and it is certainly as good or better than advertised. We welcome it."

He summed up the Nike-Talos dispute: "The JCS went into this problem of Nike vs. Talos and it decided that the Army would develop, procure and employ guided missiles out to a certain range and the same paper said the AF would develop, procure and employ guided missiles beyond that range. Talos comes beyond the range of Nike."

NACA Losing Key Men

Salary competition for top-flight engineers and scientists is taking its toll at National Advisory Committee for Aeronautics (see p. 90).

Many key personnel already have left, more are awaiting action by Congress on salaries.

Virtually every major aircraft and engine producer (except Grumman and Northrop) has hired one or more NACA personnel within the past 15 months. Two firms, one airframe and one engine manufacturer, have hired a total of 32, or 22% of those leaving NACA for industry.

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HS26

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Letters

Dissenting Opinion

To the Editor:

I'd like to register a dissenting opinion and record what I think are inconsistencies regarding your editorial "It's the Season for Going off Rockers."

First, did your tour of Russia include an unfettered look at military aircraft projects? You can speak freely at their deficiencies in almost any other field, but your own magazine has carried articles about the "America" bomber, a long-range turboprop with underground production facilities, airfields, etc. So they can't build a toilet that'll flush, etc. We're not going to fight them with flush toilets and views from atop the Mark. We didn't beat Hitler with quality, we swamped him.

As for the Tu-104, what difference does it make if it is a bomber conversion or a Russian copy of some one else's aircraft? It's a jet transport and there are no other countries in the world who have a successful turbojet transport, us included.

I'd also like to take issue with you on the Dave Garroway dig. I'm no Garroway fan, but he's got as much right as you or Seversky or Willson or Eisenhower to talk about vital American issues. Nobody refuted him with facts, just pooh-poohs.

One more thing, I'm not afraid of the Russians if our people get some facts about air power, but I am afraid of bureaucrats who can't see our crying need for Seversky-type airpower, second to none. If we don't get off our complacent backsides, we're going to get clobbered by the impossible.

L. S. ABBOTT

Aircraft Structures Engineer
Wichita, Kansas

EDITOR'S NOTE: Reader Abbott makes some good points and poses some logical questions. But to be a power capable of successful world aggression requires a very strong overall economy with great sustaining ability, including a vast reservoir of resources and first class internal transport. As for the Tu-104, give the Soviets full credit, but the reason jet transports haven't been built heretofore in the U.S. is through no ability to build them but because of airline economics, economy of operating, and meticulous airline requirements. Maybe the Tu-104 meets these requirements, but probably not.

As for Reader Abbott's comments about bureaucrats who can't see the need for leadership in the air, all we can say is: Amen. By no conceivable means would we condone any slack in U.S. airpower development; in fact it isn't moving fast enough.

Air Taxi Overlooked

To the Editor:

Congratulations on a nice issue on air transport progress but I was disappointed not to find any mention at all of "air taxi." Especially in view of your remarks in your editorial relative to ground handling and the time it takes to get from the airport to the traveler's home, air taxi certainly should get some mention in an "air transport" issue.

Last year our NATC air taxi operators (membership now 117) did 20% more business than the year before and we fully expect this year to be bigger yet. Complete figures are available in our Washington office. The idea is catching on slowly, we are establishing mutual promotional relations with the car rental operations in the near future on an increasing scale.

I sincerely hope that in future "air transport progress" issues you can see fit to make at least some mention of the growing air taxi segment of the air transport picture.

Congratulations also to Lois Philmus on her air traffic control article. It was very well done.

SAMUEL FREEMAN

President, National Aviation Trades Assoc.
Washington, D. C.

Editor's Note: Reader Freeman's comments are much to the point. So far the editors have been unable to dig up a suitable alibi for ignoring air taxi service and its impressive contribution to the air transport picture.

Suggestion on Reservations

To the Editor:

The confusion resulting from cancelled reservations can very easily be the straw that breaks the Airlines' back. It would seem to me that there is some equitable system that reservations cancelled within 48 hours of flight time are penalized 10% of the ticket cost—with in 24 hours, 25%—and within 6 hours, 50%. This would open up so many more available seats that the Airlines could again reestablish the customer confidence that their operating personnel have earned for them.

Keep up the good work.

J. D. LOVELEY

Dayton 5, Ohio

Books

Aircraft in Distress. By Harley D. Kysor. Published by the Chilton Company, Philadelphia. 432 pp.

This is said to be the first comprehensive compendium of information on aircraft distress operations, emergencies and evacuation, rescue aircraft interception procedures, distress communications and procedures, emergency landing and ditching procedures, first aid and survival. The author is an Eastern Air Lines pilot whose career in aviation dates back to 1933.

Electronics. By A. W. Keen. Published by Philosophical Library, Inc., 15 East 40th St., New York. 255 pp. Price, \$7.50.

A descriptive treatment of electronic devices and their application written for those not intimately connected with the field. An attempt is made, with good success, to explain away the apparent "mystery" of the subject, from its most elementary aspects, through the development of basic devices and applications, to complex uses of the science today.

AMERICAN AVIATION



New Thunderjets for old

Between now and next fall, scores of Republic F-84G Thunderjets will move through two of Temco's three plants. They represent Temco's first contract for overhaul-modification of jet aircraft — a contract that calls for completion of work on 169 of these U.S.A.F. fighters within six months.

Fast work — but typical of Temco's ability to adapt quickly to the demands of new jobs, new responsibilities.

Overhaul-modification is only one phase of Temco's complete service. Its three integrated plants offer every facility for handling any kind of aircraft work — from initial design through every step of tooling, engineering, fabrication and assembly.

Temco has the size, the skills, and the experience to handle any project efficiently, on schedule, and at most competitive cost. These abilities can be used to the benefit of your company. Let Temco show you!

Engineers: openings in all phases of aircraft design and development.



AIRCRAFT CORPORATION.

DALLAS

Industry News Digest

Soviet Airpower May Be Capable Of Devastating U.S. by 1960—LeMay

Sen. Stuart Symington's Airpower Investigation gained impetus from AF testimony that growing Soviet air strength would permit a successful, and devastating, strike against the U.S. by 1960.

SAC Commanding General Curtis LeMay offered the estimate in closed-door testimony released by the Symington subcommittee. LeMay said it was based on programmed SAC growth, Joint Intelligence estimates of Soviet airpower, and intensive "war-game" studies by SAC of possible U.S.-Soviet combat situations.

• LeMay's generally gloomy testimony was compounded by an equally dismal picture painted by Air Defense Commanding General Earle Partridge. Right now, Partridge told the subcommittee in a prepared question-and-answer open session, ADC's fighters cannot fly high enough or fast enough to intercept the Bison, the Soviet intercontinental jet bomber.

And, he added, Russia presently has "hundreds of bombers" that she can launch in an attack on the U.S.

The LeMay and Partridge testimony was complementary, in somewhat ironic fashion. While LeMay saw SAC's strength now as of "deterrent" quality, he foresaw the loss of SAC's power to

deter Soviet aggression by 1960, possibly sooner.

• Partridge, on the other hand, described new ADC weapons—the F-102, the Falcon air-to-air guided missile, the F-101 and F-104—as enabling the AF to cope adequately with Russian long-range bomber forces toward the end of 1958, provided the Soviets developed no strikingly improved aircraft in the meantime.

But both men added new fuel to Democratic attempts to show that the Administration has sacrificed air strength to budgetary considerations.

LeMay's testimony, despite frequent chunks deleted by the Defense Department censor, was obviously comprehensive, strikingly frank and detailed, and of the highest security classification.

• Besides personnel difficulties, which he again ranked as his top problem, and an inadequately dispersed base structure, he tabbed these as major SAC needs:

• More B-52s, and "more important now," getting a stepped-up program underway immediately to overcome lead-time handicaps.

• More KC-135 jet tankers, which he said offered more than any other single factor in strengthening SAC's effective striking power.

The B-52, LeMay said, could be built at almost any aircraft plant. Boeing's two plants alone could turn out 45 of the big jet bombers every month—more than twice the number now scheduled as the ultimate monthly goal.

• Gen. Partridge outlined a huge \$61-billion ADC program to provide "the minimum effective defense against manned aircraft." He warned that "very little" of this had been spent in the first five years of the comprehensive 1951-1965 program, and predicted that "the big costs lie ahead."

Areas of ADC deficiency—in addition to currently inferior fighter-interceptors—include, Partridge said: (1) radar coverage which is less effective at altitude than it should be; (2) fire control equipment on ADC aircraft which is less dependable than is desirable; (3) an air defense set-up which is "somewhat out of phase with SAC's base utilization program." ♦♦♦

DC-7C Beats Airfield Performance Specs

Douglas Aircraft Co. beat its airfield performance guarantees with its new DC-7C by 16%.

This bonus for airline operators of the latest model in the famed DC-6/7 line was revealed by the CAA's type certificate for the airplane at higher weights.

It means the long-range DC-7C—capable of nonstop flight in either direction over the Atlantic—also can be operated in and out of 6,000-foot airports at maximum payloads.

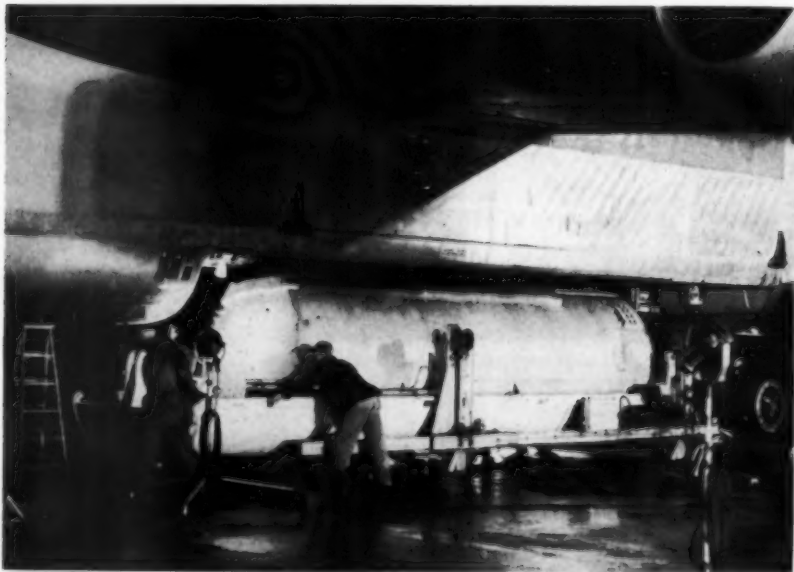
Douglas is traditionally conservative in specification estimates on new planes. But it's outdone itself with the DC-7C.

• For example, CAA takeoff distance at sea level at 140,000 pounds is 5,920 feet. That's a gain of 1,000 pounds in weight. The maximum operating takeoff weight Douglas had guaranteed to purchasers was only 139,000 pounds. It also is a gain of more than 1,000 feet in lessened takeoff distance. The guaranteed runway length for takeoff at the old weight of 139,000 pounds had been 6,950 feet.

For a high payload flight, such as an overseas coach trip, the DC-7C, at its new weights, will be capable of operating 3,750 nautical miles (4,250 statute miles), with reserves, with a full load of passengers. For a 2,000-mile flight with full payload, the DC-7C can take off at sea level in 4,075 feet.

At the higher weights approved by the CAA, the capacity payload point of the DC-7C is improved 370 nautical miles at long-range cruise, by 310 nautical miles at maximum cruise. Beyond this point, 2,800 pounds more payload may be carried.

B-52 Bomb-bay Capsule for Two



Pressurized bomb-bay capsule fitting into Boeing B-52B and B-52C eight-jet bombers can carry two-man crew, four cameras and has facilities for interchangeable electronics equipment and antennas. Capsule, designed by Boeing, is shown being hoisted into B-52 bomb-bay.

The DC-7C, now in service with Pan American in the Atlantic, made its first flight last December 20, and three aircraft were used simultaneously in five months of CAA flight-testing.

Western Electric V.P. Blasts Pentagon's Procurement Red Tape

A lively argument over the Pentagon's policies regarding basic research and a free-swinging attack on military procurement practices high-lighted the 10th annual convention of the Armed Forces Communications and Electronics Association in Boston May 24-25.

Industry men participating in a research forum made it clear they are not satisfied with the Pentagon's restrictions on the amount of basic research which contractors may charge off as overhead on their development and production contracts. But military officials took a firm stand against charging research against overhead, arguing that basic research should be financed from company profits.

• Said Brig. Gen. Earle Cooke, Chief of the Army Signal Corps Engineering Laboratory, Fort Monmouth, N. J.: "In charging research to overhead, the cost of basic research becomes dependent on the fluctuation of the development program. This is undesirable. Support of research, dollarwise, should be constant or increasing at a rate commensurate with national scientific growth."

Frederick Lack, vice president of Western Electric Co., leveled the attack on military procurement practices at a forum on military-business relations. He declared that little or nothing is being done to make participation in government business attractive, that the overall situation is growing worse from the standpoint of red tape and delays, and that many companies with other commercial business continue to supply the government for patriotic reasons only.

• Specific trouble spots are the huge masses of legislation and regulations surrounding procurement activity, too little discretion allowed contracting officers, distrust and suspicion of industry and the attempt by the government to exercise managerial control over its contractors, Lack said.

"My remarks are not directed at contracting officers," Lack emphasized. "It is my belief that they are the most conscientious, overworked, and underpaid group with whom I have ever done business. My quarrel is with the people who set up procedures instead of policies. The people who write the 'thou shalt not' directives. The demagogues who want to use military procurement for political and social objectives."



Newest Operational Super Sabre

Air Force's newest operational supersonic fighter is this North American F-100C with provisions for in-flight refueling and A-bomb capability. NAA also has flown F-100D for first time. This version incorporates autopilot and other refinements. Two versions of Super Sabre now are operational—A and C series.

More than 1,200 AFCEA members registered for the Boston convention and 77 exhibits were presented. They included such things as a high-speed Burroughs Corp. printer capable of writing 5,000 characters a second by electronic means and a Westinghouse development called the "Joysphere" for rapid and accurate tracking of radar images.

AF May Turn Copter Control over to Army

Air Force may turn over complete control of research, development and procurement of helicopters to Army. Soldiers also may be assigned responsibility for training their own copter pilots. AF decision would be in recognition of fact Army is biggest user of rotorcraft in the defense setup.

X-15 Confirmed

North American Aviation and Air Force have confirmed that NAA is developing a manned aircraft, the X-15, for investigation of high altitudes, speeds and temperatures (AMERICAN AVIATION, Jan. 2).

No other official information was released, but Navy and NACA also are reported cooperating. Powerplant will be a 20,000-lb. thrust rocket engine, speed Mach 10, altitude 250,000 ft.

KLM Places Order for Hamilton Standard Props

KLM Royal Dutch Airlines last week became the first carrier to depart from the General Motors' engine/propeller combination on the Lockheed Electra. KLM has signed up with United Aircraft Corp.'s Hamilton Standard Division for its new Model

54H60 prop, a 13-foot diameter installation using four hollow-aluminum blades.

Hamilton-Standard says the 54H60 will incorporate new control safety features and mechanical design for turboprops based on conventional structural features of Hydromatic props used on about 90% of transports today.

A major maintenance feature will be the containment of all prop control elements in a single accessible assembly which can be removed without changing propellers. In addition, all propeller functions affecting safety of flight will operate independently of the aircraft hydraulic and electrical system.

Follow-On C-130 Order

Air Force has awarded Lockheed Aircraft's Georgia Division a \$106-million follow-on contract for C-130 Hercules turboprop transports. It represents the fourth AF order for C-130s and extends production into early 1958, Lockheed says.

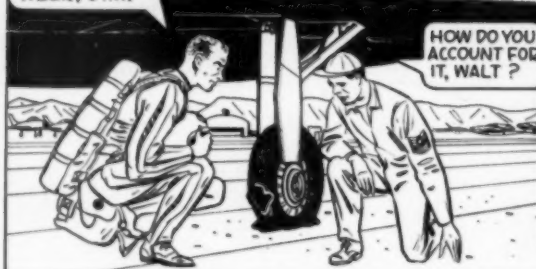
Technicians Find Many Turbine Test Problems

Airlines planning future jet transport operations were given their first preview in New York of what this may mean in the way of turbine engine test problems and what they heard could hardly be called encouraging.

The occasion was the third aviation test equipment symposium sponsored jointly by Greer Hydraulics, Inc. and Navy's Bureau of Aeronautics. More than 100 test equipment technicians heard military specialists report test-stand periods of as long as 40 hours to calibrate a single jet fuel control.

Such operations extend upward as
(Continued on Page 19)

**ANOTHER BLOWOUT.
THAT BLASTED LOCKED
WHEEL PROBLEM!**
THAT'S THE THIRD ONE THIS
WEEK, JIM.



HOW DO YOU
ACCOUNT FOR
IT, WALT?

SAME AS THE OTHERS.
WHEN YOU COME IN
FAST, YOU HAVE NO
"FEEL" FOR THE BRAK-
ING ACTION. TOO MUCH
BRAKE PRESSURE
LOCKS THE WHEEL
AND IT BLOWS BEFORE
YOU KNOW WHAT'S
HAPPENING. THOSE
SKIDS
OCCUR TOO
FAST FOR
HUMAN
REFLEXES



EXCESSIVE TIRE
WEAR... FLAT
SPOTTING...
BLOWOUTS. IT'S
BECOME A BIG
HEADACHE WITH
THESE SUPER-
SONIC BABIES,
WALT. I'VE BEEN
READING ABOUT
THIS "HYTROL"
ANTI-SKID
BRAKING SYSTEM
AND ...

YEAH, BUILT
BY HYDRO-AIRE.
THAT REMINDS
ME--THEY'VE
INSTALLED
"HYTROL" ON
ONE OF OUR
SHIPS. I'M
SCHEDULED TO
CHECK IT OUT
TOMORROW.
WONDER IF
THAT'S THE
ANSWER.

MEET ORV WILKINSON
FROM HYDRO-AIRE. HE'LL
EXPLAIN HOW "HYTROL"
HELPS YOU MAKE SURE,
SHORTER LANDINGS IN
THAT NEW SHIP.

"HYTROL" SUPPLEMENTS THE
REGULAR BRAKING SYSTEM.
IT SENSES THE INCIPENT
SKID AND RELEASES THE BRAKE
TO PREVENT IT... THEN IT RE-
APPLIES BRAKE PRESSURE IN
A RAPID "ON-OFF" ACTION, FOUR
TIMES A SECOND.



THE NEXT DAY
IN THE OFFICE
OF THE CHIEF
TEST PILOT

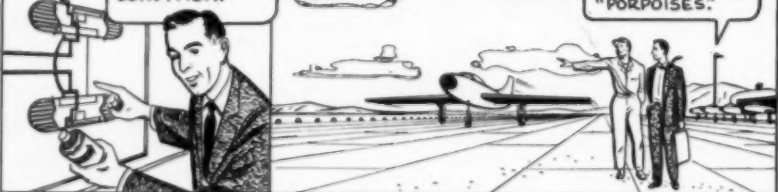
THE BASIC UNIT OF "HYTROL" IS
A SKID DETECTOR MOUNTED IN
EACH WHEEL. EACH SENSES THE
SKID AND TRANSMITS AN ELE-
CTRICALLY CONTROLLED SIGNAL
TO A SOLENOID VALVE IN THE
BRAKE PRESSURE LINE. FAIL-
SAFE ACTION
ASSURES BRAKES
UNDER ANY
CONDITION.



YES, IN TESTS "HYTROL" HAS DECREASED
THE LANDING ROLL BY AS MUCH AS 30%.
THE PILOT MAY LAND WITH BRAKES FULLY
APPLIED AND KEEP FULL PEDAL FORCE.

"HYTROL" PREVENTS
BRAKE ENGAGE-
MENT PRIOR TO
TOUCHDOWN AND
THE WHEELS WON'T
LOCK IF THE PLANE
"PORPOISES."

WALT'S BRINGING HER IN NOW,
MR. WILKINSON. GOOD LANDING!



I'M SOLD ON "HYTROL", JIM. THAT
WAS AS NICE A LANDING AS I'VE
EVER EXPERIENCED.



NOT A MARK ON THE
TIRES, EITHER. AND
NO OVERHEATING OF
THE BRAKES. YEP,
HYTROL'S THE ANSWER
TO LANDING A SUPER-
SONIC FIGHTER.

Notes on *hytrol* the accepted Anti-Skid Braking System

hytrol Saves Tires:
performance rec-
ords prove savings in tire
wear of 30% or more.

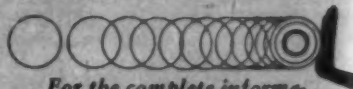
**hytrol Eliminates
Blow-Outs**
due to skidding;
and a blow-out can cost
much more than just a tire!

**hytrol Increases
Aircraft Utilization:**
Hytrol users re-
port a marked reduction of
unscheduled repairs.

**hytrol Minimizes
Runway Mishaps**
due to overshoot-
ing, swinging or late take-off
rejections — and safety pays
off in dollars!

**hytrol Controls
Bad Runway
Conditions**
ice, rain, slush,
snow . . . all of these bad
weather "skid gremlins" are
controlled by Hytrol's Anti-
Skid Action.

**hytrol is Standard
Equipment on:**
B-47, B-52, A-1, RB-66, RF-
84F, F-100, C-130, QF-80, and
has been installed on more
than 30 different types of
aircraft.



For the complete informa-
tion on Hytrol write to:

HYDRO-AIRE Inc.

Aviation subsidiary of
CRANE CO.
3000 Winona Avenue
Burbank, California

Every Fighter, Every Bomber, Every
Transport Is Hydro-Aire Equipped

When & Where

JUNE

- June 3-8—Summer meeting Society of Automotive Engineers, Hotel Chalfonte, Atlantic City.
- June 4-8—National Fire Protection Association 60th annual meeting, Boston.
- June 5-6—Radio Technical Commission for Aeronautics spring meeting with Boston sections of IRE and IAS, Boston.
- June 5-7—ATA-CAB annual airworthiness review, Chamber of Commerce of U.S., Washington, D. C.
- June 6-8—American Society for Quality Control, Palais Du Commerce, Montreal, Canada.
- June 6-8—Air Transport Assn. airline finance and accounting conference, Ft. Worth.
- June 12-14—Radio - Electronics - Television Manufacturers Association convention, Edgewater Beach Hotel, Chicago.
- June 13—B. F. Goodrich Technical Forum sponsored by Atlantic Aviation Corp. and Airwork Corp., Teterboro Airport, N. J.
- June 17-21—Semiannual meeting American Society of Mechanical Engineers, Hotel Statler, Cleveland.
- June 18-21—National summer meeting of Institute of Aeronautical Sciences, IAS Building, Los Angeles.
- June 19—Tenth session of International Civil Aviation Organization Assembly, Caracas, Venezuela.
- June 20-22—Aviation Distributors and Manufacturers Association 27th annual meeting, Grove Park Inn, Asheville, N. C.
- June 30—Jet age conference Sheraton-Jefferson Hotel, St. Louis, Mo.

JULY

- July 7-10—Tenth annual All-Woman Transcontinental Air Race, San Mateo County (Calif.) to Flint, Mich.
- July 10-Aug. 9—International Aviation Exposition, Mexico City.

AUGUST

- Aug. 1-5—Air Force Association annual convention, Roosevelt Hotel and Municipal Auditorium, New Orleans.
- Aug. 3-5—Experimental Aircraft Assn. 4th Annual Fly-In, Oshkosh, Wis.
- Aug. 15-17—IAS National Turbine-powered Air Transportation Meeting, Grant Hotel, San Diego, Calif.
- Aug. 21-24—Western Electronics Show and Convention, sponsored by IRE and West Coast Electronic Mfrs. Assn., Pan-Pacific Auditorium, Los Angeles.
- Aug. 22-24—Bendix Scintilla Int'l Ignition conference, Sidney, N. Y.

SEPTEMBER

- Sept. 1-3—1956 National Aircraft Show, Will Rogers Field, Oklahoma City.
- Sept. 3-9—Society of British Aircraft Constructors exhibition and flying display, Farnborough, England.
- Sept. 12-22—International Air Races, U.S., England, South Africa.
- Sept. 17—Annual general meeting International Air Transport Assn., Edinburgh, Scotland.
- Sept. 25-29—International Association of Aircraft Constructors jet transport conference, The Hague.

OCTOBER

- Oct. 1-3—National Association of State Aviation Officials annual meeting, Lake Placid, N. Y.
- Oct. 7-8—SAE National Aeronautical Meeting, Aircraft Production Forum and Engineering Display, Hotel Statler, Los Angeles.
- Oct. 9-10—Second annual symposium on aeronautical communications sponsored by IRE, Hotel Utica, Utica, N.Y.
- Oct. 10-12—SAE National Transportation Meeting, Hotel New Yorker, New York.
- Oct. 23-25—National Business Aircraft Association 9th annual meeting and forum, Miami, Fla.
- Oct. 25-26—Aircraft Electrical Society annual display of electrical equipment, Pan-Pacific Auditorium, Los Angeles.
- Oct. 29-30—Third annual East Coast Conference on Aeronautical and Navigational Electronics, sponsored by IRE, Sheraton Belvedere Hotel, Baltimore, Md.

NOVEMBER

- Nov. 8-9—SAE national fuels and lubricants meeting, Mayo Hotel, Tulsa, Okla.
- Nov. 26-30—Third international automation exposition, Trade Show Building, New York.

JUNE 4, 1956

Pan American to use SKYDROL in first U. S. jet liners



Twenty-five long-ranged Douglas DC-8s, powered by P&W JT-4 engines, will be delivered to PAA starting in December 1959.

Pan American's twenty Boeing 707s, scheduled for delivery beginning in December 1958, will include 12 JT-4 powered "intercontinental" versions.

Typical flight times for both the Douglas DC-8 and the Boeing "Intercontinental" will be New York-London in 6 hours, 15 minutes; Tokyo-Seattle in 8 hours, 32 minutes.

Pan American's mammoth order for 25 Douglas and 20 Boeing commercial jets is the largest aircraft order ever placed by a private company... the first firm purchase of jets ever made by a U. S. airline. And Pan American recognizes that the jet age is also an age of high-performing synthetic lubricants. The company has specified fire-resistant Skydrol fluids to be used in the hydraulic systems of both types of aircraft.

Skydrol fluids offer safety, higher lubricity than petroleum fluids, which means longer pump life, less maintenance and greater operating economy. Whatever your hydraulic fluid needs, there's a Skydrol "tailored" for the job—in jets as well as piston engine aircraft! For more information, write Organic Chemicals Division, MONSANTO CHEMICAL COMPANY, Dept. SKD-8, St. Louis 1, Missouri.

Skydrol: Reg. U. S. Pat. Off.

34 MAJOR AIR CARRIERS NOW USING SKYDROL

AMERICAN	WESTERN	LAN
BRANIFF	AIGLE AZUR	TAI
CONTINENTAL	CATHAY PACIFIC	UAT
FLYING TIGER	ALITALIA	LAI
PAN AMERICAN	SWISSAIR	ANA
CANADIAN PACIFIC	UNITED	ARAMCO
NORTH AMERICAN	DELTA	U.S.A.F.
AIRCOACH	SLICK	B.O.A.C.
TRANS-CARIBBEAN	JAL	NORTHWEST
NATIONAL	PAL	AIRWORK, LTD.
NORTHEAST	CWA	LASCA
PANAGRA	KLM	



Where Creative Chemistry
Works Wonders For You

Circle No. 7 on Reader Service Card.



Here is the ideal protection for wiring assemblies requiring a high degree of environmental resistance without the use of metal conduit.

Scinseal, originated and developed by the Scintilla Division of Bendix*, is a multi-purpose thermo-plastic material designed to protect and seal vital wiring assemblies from every operational hazard.

By the combination of plasticizers, stabilizers, pigments and fillers, Scinseal has been formulated to meet the requirements of many adverse conditions.

For example, one usage may require low-temperature flexibility, while another is concerned primarily with a high temperature condition, and still other applications may present fuel and acid problems—or perhaps a combination of all of these characteristics is the desired result.

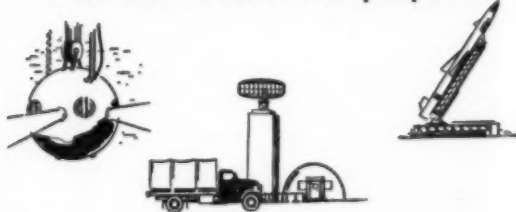
That is why Scinseal is virtually a miracle material, for it can be "tailored" to meet a wide range of requirements, and at the same time, minimize the weight of the finished product.

Scinseal can be provided in a variety of solid colors, and can be hot stamped to provide positive identification. Many electrical connector adapter molds are available, as well as the T's, Y's and variable molds necessary to provide reliable assemblies of any configuration.

Detailed information and data on Scinseal available on request.

*TRADEMARK

Can be tailored to meet individual needs and purposes



Scinseal is used in such specialized fields as underwater devices, ground radar equipment, missile control wiring.

SCINTILLA DIVISION OF BENDIX AVIATION CORPORATION
SIDNEY, NEW YORK



Industry News Digest

(Continued from Page 15)

high as 100 hours for units on some turboprop engines. Even for the less complex installations, average test time to calibrate these accessories runs 16 hours.

Opinions expressed at the session supported the growing contention that only an extensive research program by one or more test equipment manufacturers will be successful in cutting such test figures to a level acceptable to commercial jet operators.

One manufacturer estimates such a project would entail an expenditure somewhere between \$250,000 and \$500,000, but that it would pay its way many times over both for civil and military operations by making available an efficient fuel control test system.

But the length of test periods is not the only problem facing the military as test devices grow in complexity. Another is personnel turnover.

One Navy facility charged with calibrating the latest of military jet aircraft components reported that it has a 100% turnover in test stand operators every six months because of the Navy's rotation program.

This puts the entire burden of training new operators on one person—the chief of the activity—and leaves the Navy in a bad way for trained test-stand operators with any background of experience to calibrate these super-sensitive jet components properly.

Other Navy personnel expressed the opinion that the only solution is the establishment of a special rating such as that now given aircraft electronics technicians. This latter program is aimed at keeping technicians on the job once they are trained by assigning a special pay classification which would take them outside the normal rotation system.

Boeing Considers Move Into Medium Jet Field

Boeing Airplane Co. is weighing a move into the intermediate-range jet transport field with a competitor for the Convair Skylark and Douglas DC-9.

Wellwood E. Beall, its senior v.p., says the company is studying a 2-to-4 engine design for flight ranges from 150 to 1,700 miles. Active discussions are under way with at least five airlines, including Northwest, United, TWA, Trans-Canada and National.

Design study at Boeing covers a gross weight range from 60,000 to 140,000 pounds with seating pegged between 40 and 60 passengers on intermediate runs at 550 to 600 mph cruise speeds.

Army Orders Cessna CH-1 Copter



Cessna Aircraft Co. has received a contract from Air Force to build a quantity of CH-1 helicopters for Army. Designation of the copter is YH-41. Army will use initial YH-41s for evaluation. First deliveries will start in mid-1957. Two-place copter is powered by a 260-hp Continental engine, has a service ceiling in excess of 15,000 ft.

Beall noted that Boeing's final proposal most likely would be powered by four engines rather than two. Boeing belief, he said, is that both the DC-9 and Skylark are larger than ideal for shorthaul operation.

News Briefs

MANUFACTURING-MILITARY

- **McDonnell Aircraft Corp.** has completed mock-ups of its twin-jet F4H Navy fighter and the F-101B fighter-interceptor.

- **Air Force** will call its "anti-missile" Plato.

- **Fairchild** late last week was expected to get new U.S. orders for the F-27 turboprop transport.

- **New orders** for the Vickers Viscount, including a large military contract, are in the works, would carry production through 1959.

- **Ford Aircraft Engine Div.** has delivered its 1,000th P&W-licensed J57. First second source delivery of the big jet was made in April 1954. Delivery of second 1,000 will take less than half the time required for the initial 1,000, company says.

- **Chance Vought Aircraft** has received a \$20-million follow-on order for its supersonic F8U-1 Navy jet fighter. New order increases total amount of Navy contracts for the Crusader to more than \$250 million.

- **Pratt & Whitney** has delivered a J75 engine to North American Aviation for the F-107. NAA was the second manufacturer to receive an engine. First was Republic Aviation for the F-105.

- **Garrison Norton** has been selected to succeed James H. Smith, Jr., as Assistant Navy Secretary for Air, it was learned. Norton, a World War II Navy captain and naval aviator, is a former Assistant Secretary of State and headed delegations to a number of international

civil aviation conferences.

- **USAF** officially confirmed a multi-million dollar order with North American Aviation for F-100F Super Sabres. This is a two-place version designed for use as a fighter-bomber, air superiority fighter, or trainer.

- **Navy Bureau of Aeronautics** may create a new long-range guided missile proving ground extending thousands of miles southwest of the Southern California area into the Pacific.

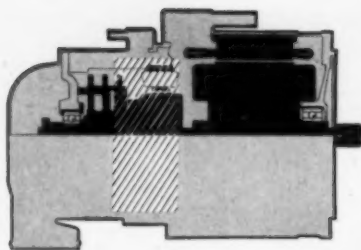
- **Marine Corps** is to receive FJ-4 Fury jets, latest in North American's series of Navy carrier-based fighters. First Marine Aircraft Wing in Japan will get the first planes.

TRANSPORT

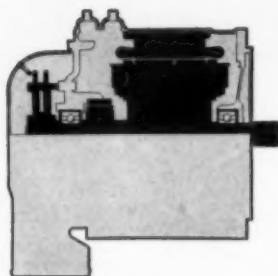
- **Francis J. Roach** was named general manager of Independent Military Air Transport Association. He had been acting general manager since resignation of president Ramsey D. Potts Jr. "Several prominent names" are being considered for president, IMATA said.

- **Western Air Lines** proposes sale of \$5 million of subordinated convertible debentures. (See story by Selig Altschul, page 37.) Purpose is to discharge \$5.8 million in bank loans connected with purchase of 17 DC-6Bs and nine Lockheed Electras. Cost of new planes, engines, ground equipment, etc., is estimated at \$48 million for 1956-58 period. The balance of \$43 million will be raised by a \$6 million five-year unsecured loan from a group of banks headed by Bank of America, issuance of \$12 million in long-term notes to Prudential Insurance Co., payment of \$25 million from company's general funds.

- **A high-speed construction** program by two or more contractors to ready a second Washington, D. C., airport at Burke, Va., by the end of 1958 was urged by a majority of the Senate Commerce Committee.



CONVENTIONAL 60 KVA GENERATOR



NEW STATICALLY EXCITED 60 KVA GENERATOR

Static exciter components mounted within the fuselage of the Lockheed Electra replace the rotating exciter of conventional generators. This design simplification reduces generator overhung moment by approximately 180 pound-inches, eases handling, and improves generator cooling and ability to withstand vibration.

Why Lockheed Electra Will Use New General

DESIGN SIMPLIFICATION GIVES RELIABILITY DEMANDED BY TURBINE-POWERED AIRCRAFT

The new Statically Excited Generator combines the proven design principles of the conventional General Electric generator with the increased performance potential of static excitation.

Unscheduled delays due to rotating exciter failure or lack of residual magnetism are eliminated. Maintenance cost is reduced because static exciter parts do not need attention between major aircraft overhauls and commutator undercutting and neutral brush setting at time of overhaul are eliminated. Reduced size of the new generator simplifies removal and installation. Also radio interference problems are greatly reduced by elimination of the commutator.

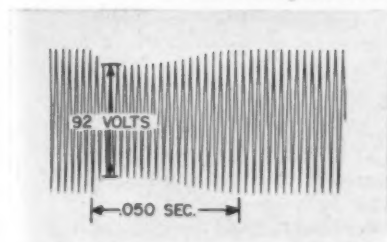
Fire hazard due to energy available for feeder fault after trip is minimized because the static excitation system retains less than one volt a-c while rotating exciter systems have residual of from 50 to 100 volts. Design improvements in the new generator allow higher operating temperatures, permitting one generator to carry the load of two under emergency conditions.

For further information on the new Statically Excited Generator contact your nearest G-E Apparatus Sales representative or write for bulletin GEA-6015, Section 210-100, General Electric Co., Schenectady 5, N. Y.

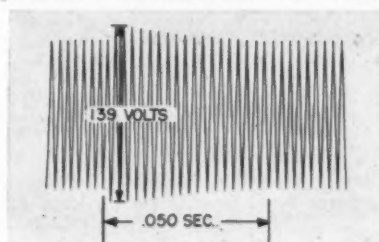


Electric Statically Excited A-C Generators

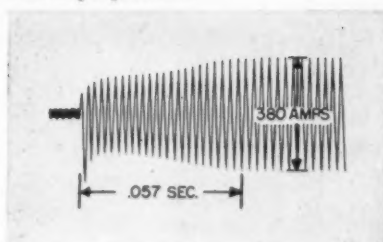
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THERE WILL BE MORE PUBLIC ROWS between the military services in the months ahead—despite Defense Secretary Wilson's vague threats of reprisals if feuding breaks out again (see page 27). Heart of the dissension over new air weapons is Wilson's own policy on weapons development. He said that successful development of a new missile system by any service doesn't mean that that service will automatically be selected to use the weapon.

This policy is a built-in stimulus to additional interservice feuding. It adds to uncertainty created by introduction of the new weapons by prolonging the time of final decision as to the user.

Services will continue to jostle each other as long as this policy is in effect. Temptation to resort to open warfare will be irresistible. And no amount of tinkering with the roles and missions of the services assigned by the 1949 Key West Agreement will resolve the difficulties until this basic cause of tension is eliminated.

●
AIR FORCE CANCELLATION of long-range interceptor and fighter-bomber competitions for lack of funds was ready-made ammunition for Sen. Stuart Symington in his airpower inquiry. But even before he could use it, the violent public quarrel erupted between the military services. This gave him an even better opportunity to show that all is not well in the defense establishment. But Symington hasn't forgotten the cancellation of the two projects. It's likely that he'll return to it as evidence of a Pentagon dollar shortage when things cool off elsewhere.

●
ARMY HAS MADE PROPOSALS involving changes in the 1952 memorandum of understanding with USAF on aviation matters. They're now before subordinates of the Joint Chiefs of Staff for review and recommendations. Then they'll be placed on the JCS agenda. Proposals have been in the making for over a year.

The document asks for an increase in Army's tactical mobility over the next four years, greater emphasis on design and development of VTOL and STOL aircraft, development and procurement of more and larger helicopters.

It doesn't call for immediate lifting of the 5000-pound limit on Army planes. Reason: Army doesn't expect a suitable plane of over 5000 pounds to be ready for procurement and operation before 1960.

●
RATIO OF THRUST AND HORSEPOWER to weight of some of the upcoming jet and turboprop engines borders on the fantastic. Lightweight Lycoming XT-53 and GE XT-58 shaft turbines will weigh 460 and 250 pounds, respectively. Yet their military power ratings will be at least 825 and 1024 shaft horsepower. Fairchild's 300-lb. J83 jet will deliver about 2000 pounds of thrust. GE's 200-lb. J85 will produce 2500 pounds. By contrast, Fairchild's current J44 delivers only half the thrust of the J83 and weighs 30 lbs. more.

●
U. S. PRODUCTION OF JET ENGINES since first delivery in 1943 is nearing the 100,000 milestone. Aircraft Industries Assn. figures better than 85,000 have been built to date. Those produced in quantity in 1950 average 4,000-5,000 lbs. thrust. Today more than 2,500 have been built in the 10,000-lbs.-plus class. Engines exceeding 15,000 lbs. capability are nearly ready for production; those aiming at 25,000-lb. ratings are under development.



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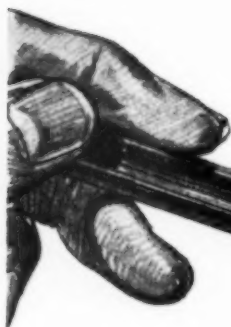
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IV	Aircraft Fuel	1-1/2"	Mot. Act. Gate Shut-Off
V	Aircraft Fuel	1-1/2"	Man. Oper. Gate Shut-Off
VI	Helium	2-3/4"	Pressure Relief Valve
VII	Helium	2-3/4"	Pressure Regulator Valve
VIII	Helium	1" & 2-1/2"	Pressure Regulator Valve
IX	Helium	2-1/2"	Pressure Relief Valve
X	Helium	3/4"	Shut-Off Valve, Normally Closed, Solenoid Pilot Oper.
XI	Helium	1/2"	Shut-Off Valve, Normally Closed, Solenoid Pilot Oper.
XII	Helium	3/8"	Pressure Relief Valve
XIII	Air	1/4"	5-Way, 4 Pos. Solenoid Act. Pop. Sel.
XIV	Hyd. Mil.-0-5608	3/8"	Pressure Reducer
XV	Tax. Corvus Smoke Prod. Oil	3/8"	Solenoid Act. Hyd. Valve Shut-Off 150 PSI.
XVI	Air or Dry Nitrogen	1/4"	4-Way, 3 Pos. Solenoid Act. Slide Selector
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Production Spotlight

• Air Force is considering a new interceptor requirement at urging of Gen. Earle E. Partridge, Air Defense Command chief, now that the Northrop-North American long-range interceptor competition has been axed. Partridge wants a medium-range (750 miles) high-speed (Mach 2) interceptor. If he succeeds and if enough R&D money can be found, there will be an MRI competition.

• Convair's Atlas ICBM project is moving along. Company, which has received a large rocket engine from North American Aviation, has opened an experimental Rocket Engine Test Station at Edwards AFB.

• Two General Electric J85s with afterburners will power the supersonic jet trainer for which Northrop just received a development contract from the AF. This marks the first known application for the 2,500-lb.-thrust J85, which resulted from a 1954 competition.

• Fairchild has not responded to overtures by Lycoming regarding installation of the T55 turboprop engine in the license-production version of the F-27 Friendship. Fairchild has no present plans to use any engine other than the Rolls-Royce Dart.

• British Air Registration Board will certificate the Comet 2, although it will not be used in airline service. ARB is satisfied with airworthiness of the jet transport following modifications. A fleet of Comet 2s will be operated by RAF Transport Command.

• Royal Canadian Air Force is returning its two Comet 1As to England for modification, notably structural strengthening. Planes will go back into service after modification.

• Sncaso's all-weather Vautour fighter prototype crashed while undergoing stall tests. Crew bailed out successfully with ejection seats developed by the French nationalized company. Aircraft had logged about 300 hours.

• A 3,100-lb.-thrust engine being developed by Dassault is expected to start bench running in France next fall.

• Twelve mothballed Navy battleships may be put back in service as launching platforms for the Jupiter intermediate range ballistic missile. To speed attainment of the Jupiter, Navy has transferred \$11 million of 1957 shipbuilding and \$5 million of aircraft procurement to the IRBM R&D appropriation.

• Present version of Nike, according to Army Chief of Staff Gen. Maxwell Taylor, is a four-cylinder model preparatory to the six and eight-cylinder Nikes still to come.

• Much as the Army would like to develop a fixed-wing aircraft with a payload of three to five tons, it simply does not seem to be able to find the money to sponsor it this year or next. Plane will be well beyond the present 5,000-lb. weight limitation.

• High Army officials hold little hope for a revival of the Vertol H-16B turboprop 40-passenger helicopter. Feeling is that the H-16 project, while it would have been successful, would take too long.

• Armament of the Hawker Hunter may be reduced from four to two 30-mm Aden guns. Terrific recoil caused by simultaneous use of four of the fast-firing heavy cannon causes structural damage to the aircraft. Two Adens are thought to have more than adequate kill-power for fighter use.

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Why the Lid Blew Off at the Pentagon

Blame it on the hot and noisy competition between services for funds and airpower roles; and the fire still rages.

By HENRY T. SIMMONS

THE LID popped off at the Pentagon last month and the public, for the first time since the B-36 row seven years ago, got a good look at the inferno of interservice rivalry which has blazed within the nation's military headquarters ever since its "unification" in 1947.

The Army started the ruckus by "leaking" a bundle of staff studies to several newsmen. The papers embodied a bitter attack on the Air Force and the nation's policy of strategic deterrence with air/atomic power to prevent war. The airmen promptly retaliated with two leaks of their own—one making mincemeat of the Army's Nike anti-aircraft missiles and the other blasting the Navy's ability to conduct strategic air warfare from carriers.

• **Defense Secretary Charles Wilson** clapped the lid on the acrimonious debate with a dramatic press conference attended by most of the service secretaries and all the Joint Chiefs of Staff. Gen. Nathan Twining, Air Force Chief of Staff, and Gen. Maxwell Taylor, Army Chief of Staff, disavowed the views presented in the staff studies and promised inquiries to find out who did the dirty work.

Wilson later warned: "Let's see who sticks his head up next. I think it might be a little dangerous."

An uneasy peace settled over the Pentagon in the wake of the outbreak. Speeches were carefully cleansed of their controversial elements, and the Army and Air Force ostensibly sought to put their houses in order. But no one seriously believed that Wilson, with his show of unity and threat of reprisals, had extinguished the fires. It was universally felt that the conflagration continued to smolder beneath the surface, awaiting a new opportunity to gush forth, and that a drastic reorganization of the Pentagon along new lines would be necessary to effect a permanent cure for the interservice fighting.

The nature of this cure, however, was not clear. At least two long-term solutions were suggested, but there was

no agreement that these would succeed, and some fear that they would seriously threaten the vitality of the military services:

- A detailed revision of the Key West Agreement of 1949 which assigns roles and missions to the three military services.

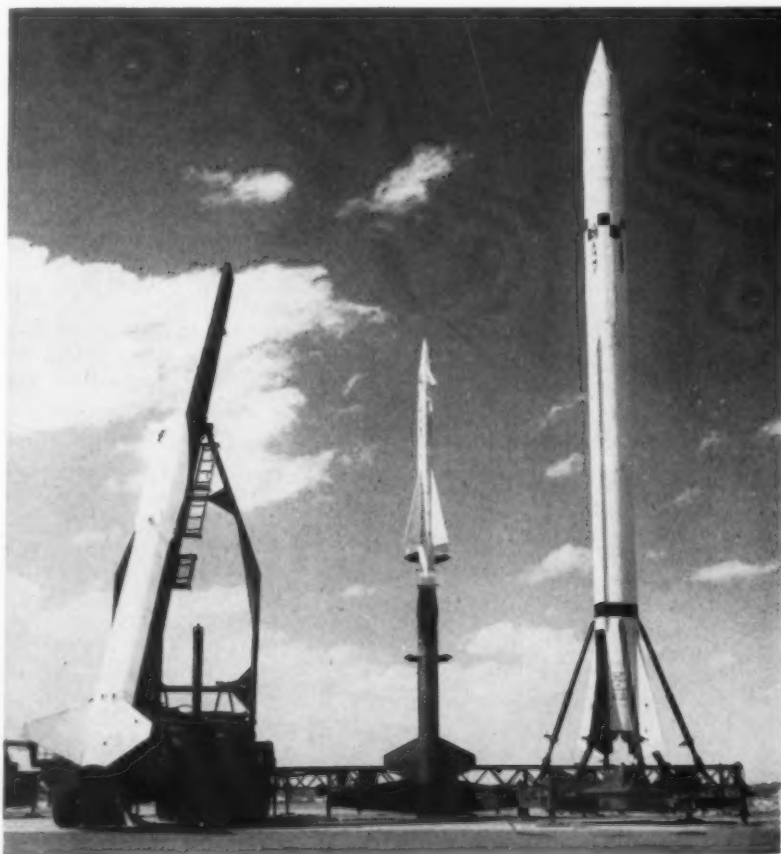
- Enactment by Congress of a stringent new unification law to replace the National Security Act of 1947 under which the Pentagon presently operates.

Three basic issues lay at the heart of the interservice quarrel which

erupted into the press last month:

- **Air defense of the U.S.**—The Army has steadily encroached upon this Air Force mission with anti-aircraft missiles of growing range. The Army's articulate Research and Development chief, Lt. Gen. James Gavin, insists that the Army recognizes no arbitrary limit on the development of its weapon systems.

The Air Force replied with a leaked "study" sharply criticizing the Nike I, now in operation, and its successor, Nike B, which is still in de-



Army's family of missiles: Honest John, Nike and Corporal. Air Force challenges effectiveness of Nike as anti-aircraft weapon. Other two are bombardment weapons.

velopment. The airmen said the latter cannot be integrated into present units without vast expense, that the guidance system probably should be changed, and that the Air Force can do a better job of air defense with its combination of early warning lines and long-range manned interceptors and missiles.

• **Strategic Airpower**—The Air Force also blasted the Navy's pretensions to strategic striking power from its carriers. These are presumably based on the Douglas A3D bomber, the Navy's latest and heaviest carrier-based bomber.

The Air Force, which regards the bomber as a light tactical weapon, hinted it has a combat radius of only 1,500 miles and declared that carrier forces attempting strategic forays against significant Soviet targets would have to risk the threat of almost certain detection and destruction in carrying them out.

• **Air/Atomic power as a deterrent to war**—The Army studies sharply criticized the basic national reliance on the threat of massive retaliation with air/atomic power as a means of preventing future wars. The papers warned that the Air Force is getting "excessive money and manpower" at the expense of ground forces, that the policy of strategic deterrence is paralyzing the nation's foreign policy, and that thermonuclear retaliation is helpless in dealing with peripheral wars and police actions.

Said one paper: "Unless there is an immediate revision of our military structure, it is probable that the international position of the United States may disintegrate to a point where we shall be forced into either total war or subjugation."

Other Issues, Too

• These are by no means the only issues among the services. Lurking in the background are such potent prob-

lems as the amazingly rapid growth of Army aviation activity and the ultimate determination of the service or services to use the intermediate range ballistic missile, presently being developed by all three. There is no question that Air Force leaders are deeply concerned by the threat these developments represent to their domination of the air, and they are fighting hard behind the scenes to prevent further encroachments.

If the issues are complex, their source is simple. It's the astounding growth of airpower since World War II and the recognition of this development by the military services. For whatever their differences, the services are agreed on this proposition: the route to victory in a future war will be through the air. And each one is feverishly developing new and more powerful air weapon systems—both aircraft and missiles—to insure its survival as a distinct and potent military arm in a murky and uncertain future.

The enormous growth in the war potential of airpower combined with the bewildering variety of new machines—helicopters and missiles, short field transports and giant cargo carriers, Mach 2-plus fighters and intercontinental bombers—have tended to erase the traditional lines of division between the services. The Air Force mission to control the air is challenged by an Army no longer restricted to the ground and a Navy no longer limited to the sea. The effect, as far as the services are concerned, has been to render obsolete the roles and missions handed the services by the Key West Agreement reached in 1949.

• **For example**, the agreement gives the Air Force the responsibility "for defense of the United States against air attack" while it authorizes the Army "to organize, train and equip Army antiaircraft artillery units." Where does Army antiaircraft responsibility leave

off and the Air Force job begin?

In the days of the Key West Agreement, the answer was simple. Everything the Army could knock down with its 90 mm and 120 mm antiaircraft batteries was its meat; the Air Force picked up from there. Since then, the ground-to-air missile with its vastly superior range has gone into operational use and has thoroughly clouded the picture. The soldiers' present Nike I is reportedly capable of 25 to 30 miles; the upcoming Nike B of 50 miles or more.

In such situations as this, the Joint Chiefs of Staff have resorted to stopgap solutions in the form of "special interpretations." In this case, the JCS agreed that the Army could work on weapons with a maximum range of 50 miles.

Today the soldiers are pushing hard against this limit and there is every indication they would like to ignore it. But Gen. Twining made it quite clear at the peace-making press conference last month that the Air Force regards the restriction as a hard and fast limit on Army antiaircraft weapons and that it has no intention of letting the Army evade it.

• **The antiaircraft hassle** is just a lone illustration of the fact that time and technological change are fast outmoding the traditional areas of jurisdiction assigned the services by both legislation and internal agreements. Attempts to patch the machinery from within by special JCS interpretations are not providing an adequate solution to the problem. A much more profound approach to the trouble is necessary if it is to be eliminated.

One suggestion has been a new interservice agreement realigning the roles and missions in some mysterious new fashion which would produce service harmony. Such an agreement would presumably control the research and development activities of the services as well, so that only the service author-

How effective is the Douglas A3D? Navy says it's a strategic bomber, Air Force says it's too short ranged (1,500 mi.). AF counterpart is B-66.



ized to use a given weapon will be permitted to develop it.

No Move by Wilson Likely

The prospects of a strong move by Wilson to iron out interservice differences with a new agreement on roles and missions appear remote. The former auto industrialist believes interservice competition is fundamentally healthy, particularly since it is similar in many respects to the competition between the divisions of his old empire, General Motors Corp. But he does resent the tendency by the services to try their differences in the press. With this attitude it is hardly likely that he will force a new agreement on the services.

There is also the possibility of a searching congressional scrutiny of the causes of the trouble followed by strong legislation imposing unification on the

services in a far more decisive manner than the present statute, the National Security Act of 1947. It has been suggested that all the services be put in a single uniform, under the command of a single military man heading a single staff.

The possibility of such legislation is just a dim shape on the horizon at this writing. Sen. Stuart Symington (D-Mo.) is directing his airpower inquiry at the causes of the interservice quarrelling, and Sen. Dennis Chavez (D-N.M.) has promised to interrogate the bickering military chiefs as a part of his subcommittee's hearings on the Defense Department appropriation request. (See story below.)

There are, of course, many people in the military establishment who believe that neither a new internal service agreement nor a new statute will cure

the hot and noisy competition between the services—nor do they believe a cure of this nature is desirable. Like Wilson, they believe that trouble is the price of progress, and that strait-jacketing the services into static roles and missions with prescribed weapons systems could do the nation irreparable harm.

Assuming an answer is possible, its terms are not clear now. And until an answer is reached, the military services will continue to bicker, both in public and in private. New technological breakthroughs are sowing the seeds of new struggles, and its doubtful that Wilson, or the President himself, will ever succeed in triumphing over the passionate dedication of the military men to their respective services unless the present system is torn up, root and branch, and replaced by a radically new system, the outlines of which cannot be predicted. ♦♦♦

Symington: Cautious Approach to a Hot Issue

Roles and missions of services will be studied. Question is: How far to go in an investigation of USAF airpower adequacy?

By FRANCIS J. KEENAN

Sen. Stuart Symington's Airpower investigation appeared headed last week for the deeper waters of basic military strategy, involving the "roles and missions" of the Army, Navy and Air Force.

In the wake of bitter inter-service feuding, which broke out of the Pentagon and into the headlines, Symington has indicated dissatisfaction with the "misty" approach toward the basic troubles which he saw in Defense Secretary Wilson's reaction to the fracas.

• **His answer**—proposed at a press conference made unusual by the fact that it was his first as subcommittee chairman, and by the presence of a major figure in the Pentagon dispute, the Army's research chief, Lt. Gen. James Gavin: broaden his inquiry to embrace the basic issues in dispute, as he put it, "the roles and missions" of the services.

Some Vital Questions

But the Senator's decision raised a number of questions:

• What role would subcommittee minority members Sens. Leverett Saltonstall (R-Mass.) and James Duff (R Pa.) play in the face of such a direct challenge to the Administration?

• How deeply was Symington prepared to go into such fundamental strategic issues as: the likely nature of any future wars; the proper balance to be maintained between the three services

in terms of weapons and manpower, in view of the variety of potential military actions; and the assignment of realistic and harmonious missions to the several defensive and striking forces of the U.S. armed services?

• How would the extension of an

already carefully-tailored schedule affect the timing of the subcommittee's job—with less than two months remaining prior to adjournment of Congress?

• How far afield would a broadened inquiry take Symington from his original purpose: to determine the

Vertol Takes on Tilt-Wing VTOL Project



Vertol Aircraft Corp. has received an \$85,000 design and development contract from Army and Office of Naval Research for a turboprop-powered tilt-wing VTOL aircraft. Single turboprop engine will be geared to two rotor-propellers mounted on wingtips. Vertol will use flying testbed approach rather than construction of a prototype to hold down development costs.

Artist's conception of project is shown.

adequacy of the USAF, especially its long-range striking power, to deter Soviet aggression?

• How much frankness would the subcommittee get from military witnesses after Secretary Wilson's threats and the President's insistence on "loyalty" to policy decisions?

Symington Moves Ahead

Whatever the answers, the Symington group proceeded on schedule last week, taking testimony from Army, Navy and AF witnesses on their respective positions in the missiles field. Next on the program, said Symington, was consideration of the Navy's airpower, both its "primary and secondary" missions.

Release of the censored testimony of SAC Commanding General Curtis LeMay and ADC Commander Earle Partridge was imminent. Partridge was also set to testify in open session.

On other Capitol Hill fronts, the airpower picture looked like this:

• Sen. Dennis Chavez (D-N.M.),

chairman of the Defense Appropriations Subcommittee, announced his group would look into the Pentagon squabbling. But the burden of lengthy, detailed hearings into service budgets appeared to preclude early attention by the subcommittee. At best, a few days of public questioning of top service brass seemed all that the Chavez subcommittee could handle.

While Chavez' first response to reports of interservice fighting was a warning of budget cuts, this was not taken as a serious threat. Up to that point in his hearings, the Chavez subcommittee appeared more concerned whether the services were asking for enough funds rather than too much, especially in the field of B-52s, jet tankers, and missiles and research.

The Pentagon outbreak may well have sealed off, however, any major effort to boost Administration defense spending beyond current estimates. Other factors, including House action, disarmament talk, and a widespread

conviction that the Defense Department wouldn't spend additional money if they got it, had already virtually blocked a major increase in any event.

House Reaction Milder

• In the House, reaction to service outbursts was milder. Rep. George Mahon (D-Tex.), chairman of the Defense Appropriations Subcommittee, considered the controversy "healthy," and wouldn't commit himself to any kind of committee investigation.

Somewhat more determined, Rep. F. Edward Hebert (D-La.) flatly stated his Armed Services Subcommittee on Investigations would not investigate the matter.

It remained, therefore, for the Senate to take whatever action the dispute called for.

And for Sen. Symington, with the backing of Armed Services Committee Chairman Richard S. Russell (D-Ga.), it was another major opportunity along his measured trail through U.S. defense policy. ♦ ♦ ♦

Will Aviation Get a Cabinet Post?

The idea isn't new, but Sen. Payne says it's the only way industry will get even voice with Defense.

By LOIS C. PHILMUS

Concern over a need for modernizing the Federal organizational structure for administering and regulating all aviation has grown consistently with the growth of the industry. As to the ideal government body to meet this need, there has been much speculation, projection of ideas and "hangar flying" on and off during the years.

Now it has reached problem proportions and some concrete ideas are needed. While one of the major assignments charged to special Presidential Assistant Edward P. Curtis is to recommend the proper governing body for developing and administering aviation facilities, there is a new feeling that even more is needed. The governmental body finally created for this purpose, it is felt, may not have full jurisdiction over the entire air transport system.

Many experts foresee the need for a Federal aviation structure that would have full jurisdiction over, not only air traffic control, airways and airports, but all aviation up to specific tactical needs of the military. It would encompass all military and civil transport, safety activities, coordination of all non-tactical development, as well as the facilities.

• A recent proposal by Sen. Frederick G. Payne (R-Me.) before the Senate Aviation subcommittee calling for the creation of a Cabinet Secretary

of Air kindled the imaginations of official Washington and industry observers. The idea is by no means a new one, but its proposal at this time seems more realistic than heretofore.

Sen. Payne, Republican member of the subcommittee, made his proposal during recalled hearings on Chairman A. S. Mike Monroney's bill of divorcement for CAA from the Department of Commerce. Payne declared that he didn't care whether CAA was independent or part of Commerce, which reflects the attitude of all of the aviation industry with the exception of the general aviation groups.

Payne Critical of Military

The line Monroney has been taking is that the Department of Commerce has been to blame for the problems now facing civil aviation. Sen. Payne, intimating this was superficial, set forth

that the real stumbling block to civil progress is the Department of Defense. "The great stress, great strain and great emphasis has been on what the military requires," he charged, with the military going "far afield in not giving proper recognition to the needs of civil aviation."

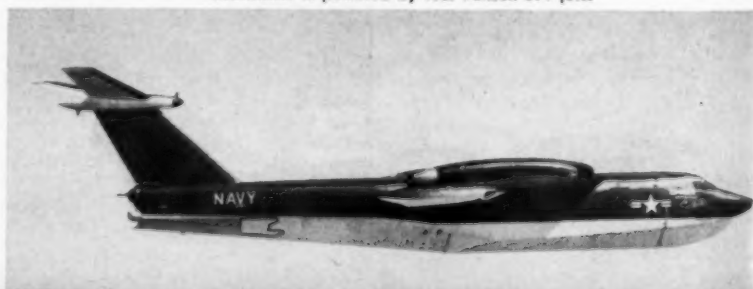
"CAA will not get its voice heard as a separate agency," he contended, adding that the "only way" for the industry to obtain an equal voice with Defense is to have a Cabinet-level Secretary of Air.

The military, he added, gets whatever it wants under the flag of "national defense" with no questions asked. This has worked to the detriment of civil aviation, which has no such righteous cloak under which to operate. "No one can resist national defense," Sen. Payne observed.

The problem of military vs. civil

Second SeaMaster Makes First Flight

Martin's second four-jet minelaying XP6M-1 has begun its flight tests. First flight of 1 hr. 25 min. was made May 18. First XP6M crashed and sank last Dec. 7. About 80% of the aircraft was recovered and the cause attributed to malfunction of the control system. SeaMaster is powered by four Allison J71 jets.





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will continue whether CAA is separate or not "as long as there is no coordination and until there is separate jurisdiction over both.

"We are going to have to have an agency that will not be civil as such," he summed up, "but a group that represents all arms of both military and civil aviation up to military tactical requirements," with authority to decide "what is good for the industry as a whole."

Using Payne's proposal as a spearhead, AMERICAN AVIATION had informal discussions with several experts in the aviation and organizational field. The following organizational structure was formulated from a composite of the expert thinking:

Pyramiding down from the Secretariat would be the Civil Aeronautics Board, possibly renamed the National Aeronautics Board. Orbit of the quasi-judicial body could be expanded to handle not only airline routes and rates and safety enforcement matters but military transport activities as well. It is seen as one solution to the continuous criticism of the role of the Military Transport Service and the Fleet Logistic Wing. MATS and FLW routes and services would be treated in the same manner as scheduled airline route applications.

The Board could be given the authority to determine whether MATS and FLW trips could better be handled by commercial air service or the military service. If properly and judicially handled, obvious economies and efficiencies in air transport may well be accomplished through such coordination.

Streamlining Would Help

Consolidation of the functions of the present Civil Aeronautics Administration with certain Board activities also could provide considerable streamlining. CAA's Office of Aviation Safety merged with Board Safety functions of safety regulation and investigation are possible, creating one large safety division in the new agency rather than the two autonomous bodies now functioning. Clearer lines of responsibility could thus be established, eliminating much duplication in personnel and overlapping of duties.

A separate Office of Air Traffic Control, responsible directly to the Secretary, could be worked to constructive advantage. With the "civil" label removed, the office or department would be charged with clear-cut authority to control all traffic in the continental U.S., working in close liaison with all military and civil operators, but with proper authority over all.

All separate elements of development and operations now strewn through CAA's Airways Engineering



SEN. PAYNE

divisions, Air Navigation Development Board and the armed forces would be consolidated into one large development body under the jurisdiction of the Air Traffic Control parent department. It is felt that this would provide an orderly progression for Common System development.

One of the main problems foreseen in such a plan would be to clearly define actual military tactical requirements for defense from the nucleus of the federal airway system which would be needed by all operating aircraft.

•Elimination of the Air Coordinating Committee would be inevitable. Primary function of the ACC ideally is to coordinate all air needs of all avia-

tion. The proposed Secretary of Air would be the coordinator. ACC's main failure has been in its equality for all. It has, in many areas, perpetuated the individual interest and sharpened differences between military and civil, rather than consistently coming forth with unanimity in compromise.

It must be strongly emphasized that the composite is strictly future thinking. No one interviewed by this writer has wanted to second-guess Curtis, but discussion is bound to continue. What is emphasized is that no change in the organizational structure should be attempted at this time, including CAA's separation from Commerce.

•Most vital reason is that aviation planning is at too critical a stage for any upset, with too many matters being held in delicate balance. The pundits are merely conjecturing and predicting. One point is acknowledged, however: a Secretary of Air is inevitable in the next few years. The industry has grown too large for separate groups, scattered throughout other agencies whose primary duties are other than air transport.

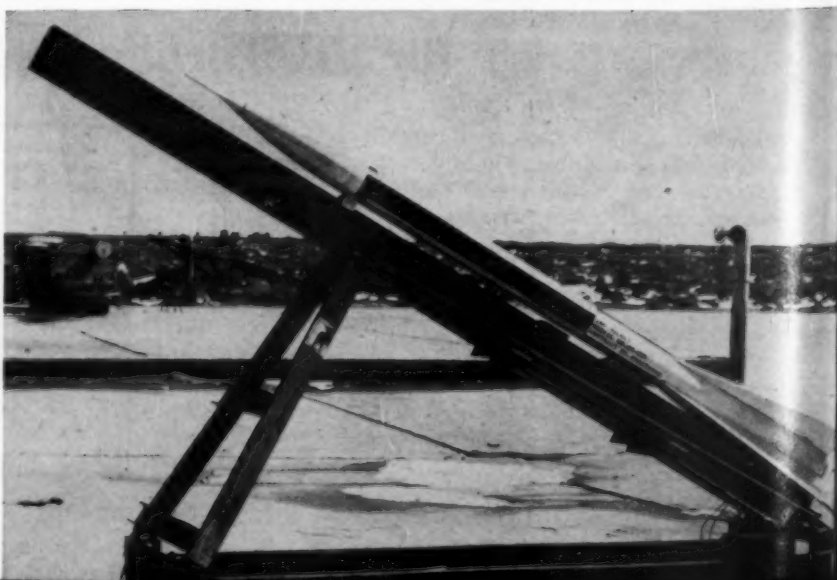
Rather than attempting piecemeal action now, such as CAA separation, it is felt that every cooperation should be extended to Curtis in his monumental task.

Senator Monroney was probably correct when he replied to Senator Payne's proposal that he doubted that such a Cabinet post could be recommended "at this time," although he thought it a "good long-range objective."

But the stimulation of discussion is constructive and could be of great assistance to Curtis. ♦ ♦ ♦

Mach 5 Rocket to Probe Upper Atmosphere

Navy has unveiled the ASP, a new high-speed missile designed to study the atmosphere up to 150,000 ft. Horning-Cooper, Inc., Monrovia, Calif., developed the ASP (Atmosphere Sounding Projectile) for Bureau of Ships in less than five months. Company also developed a system for receiving and recording data from the missile. ASP is 12 ft. long, 6½ in. in diameter, is powered by a solid propellant and has a top speed of Mach 5. It carries a 40-lb. payload of instruments.





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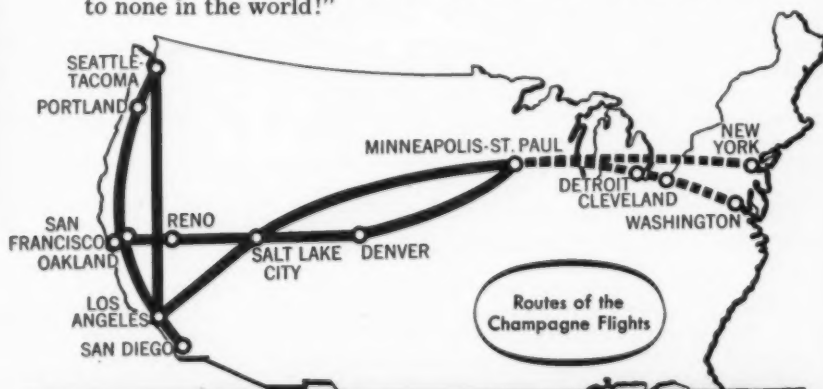


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WESTERN AIRLINES

Labor Leaders Plan One Big Union For All Flight Personnel

CHICAGO—A labor organization of all personnel who go aloft is under serious consideration by top echelon leaders of the AFL-CIO, according to Clarence N. Sayen, president of the Air Line Pilots Association.

He told AMERICAN AVIATION that AFL-CIO president George Meany and other leaders of the labor federation are convinced that such an Aviation Division is the only solution to the jurisdictional disputes which frequently arise in the airline field.

Sayen said it is his understanding that ALPA, which now has more than 10,000 active members, would be the dominant part of the new airline labor organization. Other groups, such as flight engineers, navigators, stewards and stewardesses, etc., would become affiliates of ALPA under the proposed organization, Sayen reported.

•The new setup would differ markedly from existing procedures principally in that the Flight Engineers International Association, headed by William D. Kent, would be integrated with ALPA. The two unions have feuded consistently, with Kent frequently accusing ALPA of raiding (by organizing combination pilot-flight engineers) and strike-breaking (by refusing to honor FEIA picket lines, as in last year's FEIA strike against United Air Lines).

Kent has gone on record with a statement that he is opposed to any such merger of flight personnel and has even been reported considering an affiliation with the Teamsters Union, headed by Dave Beck. But Beck, an AFL-CIO vice president, currently faces the possibility that his union may be ejected from the AFL-CIO because of entanglements

with the communist-line Longshoremen's association.

Outlines ALPA Objectives

Sayen, who comes up for reelection as ALPA's president this fall, also told AMERICAN AVIATION that:

- ALPA is planning to narrow the gap between wages paid to pilots on local service airlines and trunk carriers within two or three years. He pointed out that salaries paid to pilots flying the same equipment for feeder lines now average \$50 to \$75 a month less than those paid to trunkline pilots.

"Manufacturers don't charge feeder lines less for planes and oil companies demand the same price for their gas oil from feeders and trunks. Why should ALPA subsidize the local service lines?" asked Sayen.

- About 8,500 of ALPA's members will get a 26% return on their 1955 dues this year as a result of a ruling made at the 1954 convention that the pilot union's net worth must be a minimum of \$2½ million and not more than \$275 per member. As a result \$376,000 will be rebated to the members who have paid up their 1955 dues.

(Many ALPA members are unhappy about the money to be returned, however. Although dues refunds by unions are almost unheard of, some pilots feel the sums to be paid out are insignificant when divided among the 8,500 members. On the other hand, a \$376,000 kitty, they say, might be used to improve ALPA's services to its members.)

- The \$850,000 headquarters building adjoining Chicago's Midway Airport will become the union's property this month when the last \$30,000 mortgage

Parrish Receives Award For Aviation Writing

A Paul Tissandier Diploma for distinguished service in the field of aviation writing was awarded to Wayne W. Parrish, editor and publisher of American Aviation Publications, in absentia by the Federation Aeronautique Internationale in Vienna at a meeting of its General Assembly. C. S. Logsdon, executive secretary of the National Aeronautic Association, accepted the diploma on Parrish's behalf.

payment is made. As a matter of fact, the amount of office space currently being utilized by ALPA and its affiliated unions is rapidly becoming inadequate.

To Abandon Nonsked Union

- Plans are under way to abandon the affiliated Air Carrier Pilots Association, which was created to organize pilots on non-scheduled airlines. ALPA's directors have decided that CAB's recent ruling granting 49 non-skeds rights as supplemental air carriers effectively makes them scheduled airlines and means that their pilots are eligible for membership in ALPA.

- Little progress has been made to date in lining up the pilots who would fly the 300-odd four-engine transports which would be supplied by air carriers to the Military Air Transport Service under the Civil Reserve Air Fleet program in case of emergency.

"Many of the pilots are now being counted for use in two or three slots," Sayen said. "Some are MATS reservists and MATS is planning on calling them up. At the same time, the airlines are thinking of furnishing these pilots with the planes. And some are even being counted a third time—for airline use under the WASP (War Air Service Pattern)."

- In 1955, the average ALPA member received about \$12,000 in salaries. First pilots averaged about \$15,000, co-pilots about \$8,200. ♦♦♦

ALPA to ask Funds for Training Pilots So They Can Get Mechanics' Licenses

ALPA may soon demand that American Airlines provide the funds to provide its pilots with licenses as flight mechanics.

American has signed a new contract with the Flight Engineers International Association providing that all flight engineers must have A.&E. licenses or obtain them within 12 months.

ALPA president Sayen says the union has no argument with AA's new requirement that flight engineers have the mechanic rating. ALPA believes, he indicates, that the third man in the cockpit of AA's DC-6 and DC-7 type aircraft, as well as on upcoming Electras and 707 jets, should be a qualified pilot.

"If American wants the third man to hold a mechanic's license, ALPA has no objection. But we will expect the airline to pay the cost of training pilots as mechanics," he said.

J57 Engine Replaces J71 in Northrop Snark

The Pratt & Whitney J57 turbojet engine has replaced the Allison J71 in Northrop's SM-62 Snark intercontinental guided missile.

First public display of the Northrop missile was made in Washington during Armed Forces Day. It is 74 ft. long, has 42-ft. wing span and is about 15 ft. high. Launching is by means of two large booster rockets which are attached to the fuselage and ejected after use.



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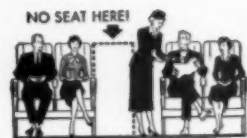


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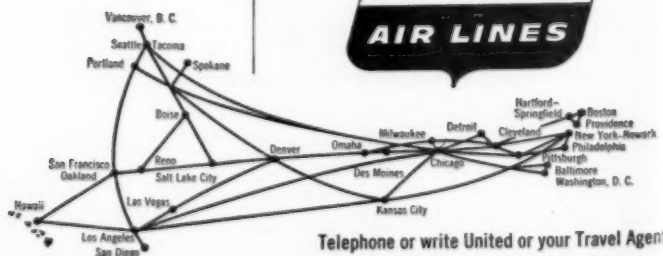
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AMERICAN AVIATION

Aviation Convertibles Look Good to Investors

By SELIG ALTSCHUL

Convertible-type securities are becoming more prominent in aviation financing. This is revealed by the announced plans of Western Air Lines featuring the proposed sale of \$5 million in subordinated debentures to the public as part of its program to obtain \$23 million in new funds to finance its capital expansion.

In viewing the capital demands of the separate airlines and their current financial positions, it is probable that at least two more major air carriers will soon incorporate convertible-type securities as integral phases of their financing programs. Such additional public financing will await firming-up of plans subject to current earnings trends and the condition of the money and securities markets.

Convertible debentures have enjoyed wide investment popularity and, to a great extent, where utilized, have replaced the offering of common stock in the industrial field.

• As aircraft and airline companies have improved their investment and speculative acceptance, they have been able to utilize this convertible-type security to good advantage. This "two-way" security is attractive to investors and thus frequently easier to market than a straight equity issue.

There is a good basis for this type of financing in attracting the favor of industry and investors alike. The issuing company benefits in that interest paid is regarded as an operating expense for income tax purposes. With the corporate tax currently at 52%, managements can, in effect, save half their interest cost as compared with dividend payments on the common stock.

While, in the case of the aircraft builders interest on borrowed capital, such as that available from debentures, is not an allowable cost in the pricing processes on government contracts, the cost of capital to a company is generally lower through the convertible debenture route than through direct stock financing.

Delayed Action Common Stock

• In effect, issuance of convertible debt frequently is nothing more than a delayed action issuance of new common stock. The conversion does not take place until the market value of the common stock reaches the usually higher price designated by the conversion contract.

By issuing convertible debt, a company can for practical purposes place it-

Aviation Convertible Securities					
Aircraft	Moody's Bond Ratings	Amount Out- standing Dec. 31, 1955 (000,000)	Recent Market	Con- version Price	Recent Market Common
Aircraft					
General Dynamics					
3½'s of 1975	Baa	\$40.	104	\$74.20	59
Lockheed					
3¾'s of 1980	Ba	29.99	104	50.00	45
Northrop					
4's of 1975	Ba	10.	97	27.25	23½
United Aircraft					
4% Preferred Stock (\$100 par)		24.3	118	57.14	64
Airlines					
American					
3½% Convertible					
Preferred (\$100 par)		19.37	112	20.70	23
Continental					
4¾'s of 1970	B	4.1	100	13.50	11½
Northwest					
4.6% Convertible					
Preferred (\$25 par)		7.4	24	16.66	16
Flying Tigers					
5½'s of 1967	B	2.7	140	9.375	13

self in a position to sell equity at a price above the current market. This is accomplished by setting the price for conversion into common stock at a level above the market price at the time of the sale.

The purchaser is also generally happier with a convertible debt issue. While the convertible bond carries little or no premium for the conversion feature, its market price tends to reflect money rates in the corporate bond market. It is only when the conversion feature becomes of value that the market price of the bond reflects changes in the equity market.

• In other words, if the convertible debenture is of reasonable good credit stature as a bond, it has a floor but no ceiling over the prices it may attain. This offers downside price protection. As the market price of the stock rises to equal or exceed the conversion price of the bond, both types of security advance or fall together.

While obtaining an interest return on his investment, the buyer of convertible debt also regards the exchange option as a "call" on the common stock. Once having faith in the upward course of the stock market, most purchasers are not likely to be deterred by the spread between market and conversion price.

Adopted by Aircraft Companies

These characteristics of the convertible bond have led to its ready adaptation in the last year by aircraft companies: General Dynamics, Lockheed and Northrop. In the airline group only

Continental Air Lines ventured forth last year with a convertible debenture issue. The Flying Tigers Line have had their debentures outstanding for a few years now.

The accompanying table reveals pertinent details on all major aviation companies now having convertible-type securities outstanding—both debentures and preferred stock.

Convertible preferreds have many of the features of convertible debentures, the chief difference being that they represent equity senior to the common and generally are not obligated to pay current dividends unless earned. Convertible preferreds frequently are less restrictive in the financial conditions imposed on the issuing company but do not have the tax deduction benefit peculiar to interest payments on debentures.

• In any event, whether convertible debentures or preferred stocks, more likely than not it is generally the hope of the issuing company that such securities will ultimately be "extinguished" by conversion into common stock.

While of no firm criterion, the ratings assigned by statistical services such as Standard & Poor's, Moody's, and Fitch, are frequently used as an indication of the quality of the separate bonds. Moody's, for example, uses nine symbols designating the gradations of investment quality, i.e., least risk, starting with "Aaa" and concluding with "C." Only the top four ending with "Baa" are generally considered as suit-



Official U. S. Navy Photograph

The U. S. S. Boston (CAG-1), the Navy's first guided missile cruiser, with Terrier Missiles and their launchers at the stern.

NAVY BUREAU OF ORDNANCE DEVELOPS WEAPON SYSTEMS FOR USE AGAINST ATTACK BY SEA OR AIR

The recent unveiling of the Navy's first ready-for-combat anti-aircraft guided missile weapon system—TERRIER—is but one result of the research and development work being done by the U. S. Navy's Bureau of Ordnance and a coordinated team of industrial and educational institutions.

From its establishment in 1842, the Bureau of Ordnance has provided the weapons with which the Navy has fought victoriously in six wars. With the evolution of armament, from the first muzzle loading cannons to today's complex weapons systems, it has directed the design, development, and production of the computers, fire control, and other types of equipment comprising the Navy's air, surface, and underwater ordnance.

The Research and Development Division of the Bureau of Ordnance has the responsibility of initiating and coordinating the research and development of the many projects which result in such end products as guided missiles, homing torpedoes, aircraft laid mines, and the launching and control systems for these weapons.

The job of guiding a key element of a modern day weapon system from the idea stage to the ready-for-combat stage involves a wealth of technology—drawing upon the skill, farsightedness, and courage of responsible scientific and technical personnel in the Bureau of Ordnance and its laboratories, and their counterparts in universities and industrial organizations.

This is one of a series of ads on the technical activities of the Department of Defense.

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able investment quality.

• In the final analysis, the market makes its own determinations. This can be seen from the record detailed in the accompanying table. The price of the General Dynamics debentures, for example, while far removed from the conversion value of its stock, sells at a premium above par. In fact, the lowest price established for the issue was 101¾. This is a measure of the quality of the debenture as a bond without the conversion privilege and is a tribute to the credit standing of the company.

Somewhat of the same case can be made for the Lockheed debentures. This condition definitely does not ob-

tain for the debentures of Northrop which sold as low as 95¼ and are not given much serious credit standing as a bond by discerning investors.

The price disparities that frequently develop in such investment evaluation is another way of illustrating the fact that companies are judged by their earnings record and outlook.

The convertible security is no "gimmick" that can be applied at random as a financing device for the aviation or any other industry. To succeed, it must have a firm foundation in the expectation that earnings will be present and continue to materialize at a satisfactory rate to support the issue. ♦ ♦ ♦

How Continental Won Healthy Share Of Gas Turbine Business in 5 Years

By ROBERT M. LOEBELSON

DETROIT—Nearly five years ago, Continental Motors Corp., one of the leading suppliers of small piston powerplants, decided that the French engine company, Societe Turbomeca of Bordes, had perfected a number of gas turbines that would prove highly useful in American military and civil aircraft, missiles and helicopters and purchased U.S. manufacturing rights to nine of them.

Today, that decision by Continental president Clarence J. Reese and Continental's other officers and directors appears to have paid off. At the time the license from Turbomeca was obtained, Continental Motors assigned further development and production of the French engines to an unconsolidated subsidiary, Continental Aviation & Engineering Corp., which also has its headquarters here.

(Continental A. & E. is 51% owned by Continental Motors. The remaining 49% of the stock is traded on the American Stock Exchange. It was created in 1940 as the research and development section of Continental Motors. During World War II, Continental built the Pratt & Whitney R-1340 and the Rolls-Royce V-1650-7 piston aircraft engines under license.)

• Sometime in July the A. & E. activity expects the J69 turbojet (which is based on the Turbomeca Marbore) to complete its 150-hour qualification test for the USAF. Shortly after that, efforts will be started to get the J69 certificated by CAA for civil use.

Fairchild J44 Only Competitor

In this regard, the J69 will have as its only competitor in the same thrust class, Fairchild's 1,000-pound-thrust J44, which recently was awarded a CAA certificate.

The J69, which produces 1,000

pounds of thrust in its short-life version for target drone and missile applications, is employed by the USAF in its version of the Ryan Firebee drone, the Q-2A. But the Navy's variation of the same drone, the KDA-1, uses the J44. Continental is proposing other uses of the short-life J69-T-19 in various missile applications.

• Another variation of the J69, the 920-pound-thrust T-9, is being built for use in Cessna's twin-jet T-37 trainer for the USAF and has also been installed in two other trainer proposals, Beech's Model 73 and Temco's Model 51.

The dash 9 and the dash 19 are the only models of the J69 about which Continental may talk publicly, but at least three others are in the AF's program. Another dash number is in production for a classified application (presumably a missile), a second is under development for use in an airframe and A. & E. is very hopeful on a third, which also has a classified use.

In all therefore, there are five models of the J69 with a minimum of five different applications either in existence or scheduled.

Also making up a substantial portion of A. & E.'s present backlog of more than \$40 million is the Model 140 gas turbine air generator, which is an adaptation of the Turbomeca Palouste. The Model 140 is the principal component of Continental's MA-1 portable gas turbine air generator, presently used to start the turbojet engines on such aircraft as the F-100, F-101 and F-102 fighters and the B-66 light bomber.

Commercial Possibilities

• Continental officials are equally confident that the MA-1 trailer will be used to start such commercial jet and turboprop aircraft as the Boeing 707, Douglas DC-8 and Lockheed Electra if those aircraft should require external starters.

And the J69 has several potential commercial uses as an auxiliary powerplant for transports and executive aircraft, in addition to its possible role as the principal engines in such proposed executive jet transports as the French Morane-Saulnier 760, which Beech is considering building in the U.S.

The J69 has been successfully tested as a power booster on C-46s flown by The Flying Tiger Line and in pairs as the power boost for C-46s operated by Transocean Air Lines. A. & E. officials report they have received inquiries about using the J69 on such other varied aircraft as the Grumman SA-16, Convair 340 and 440 and Fairchild C-123B.

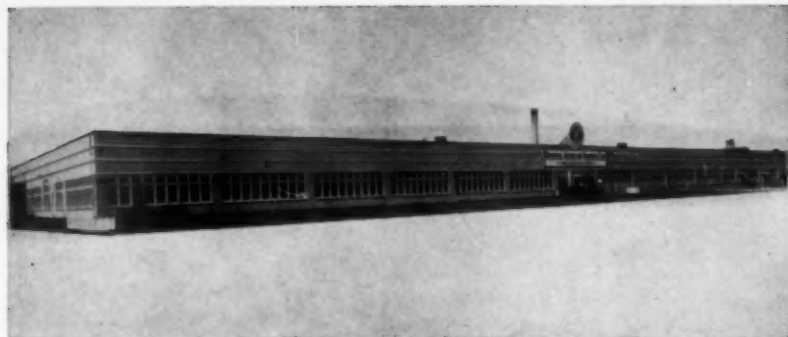
• In addition to the two big breadwinners, the J69 and the Model 140, Continental is very hopeful that another Turbomeca-licensed engine will become a production item. That would be the 280-hp XT-51-T-1 (used experimentally on the Cessna XL-19C lightplane and the Bell XH-13F helicopter and developed from the Artouste I) and the 425-hp XT-51-T-3 (being tested in the Sikorsky XH-39 and based on the Artouste II). The XT-51 is also being considered by the Army for use on ground support equipment.

As for some of the other engines originally obtained from Turbomeca, little military interest has been shown in either the 180-pound-thrust Pimene or the 320-pound-thrust Palas. Nor is there much activity with either the XT-51-T-5 free turbine or the Aspin II ducted fan although one classified study involving the Aspin II is still under way.

With jet output now centered by A. & E. at an AF-owned 300,000-square-foot facility in Toledo and piston engine production (principally for military and civil lightplanes) taken care of by the parent corporation at a 1,300,000-square-foot plant in Muskegon, Mich., A. & E.'s 172,350-square-foot building in the Motor City will be used principally for R&D on gas turbines.



C. J. REESE



Continental produces its gas turbine engines at this USAF-facility in Toledo.

• But where does Continental stand on R&D in the gas turbine field?

While Continental and Fairchild share turbojets in the 1,000-pound-thrust class, the next step, 2,000-pound-thrust, appears to be preempted by Fairchild with its J83 and General Electric with its J85, both of which resulted from a 1954 USAF competition, and the Westinghouse J81, which is an adaptation of the Rolls-Royce Soar.

In the shaft turbine category for helicopters and lightplanes, Lycoming has the 825-hp XT-53 and GE has the 1,000-hp XT-58. It would therefore appear that Continental, if it is to remain one of the dominant companies in the small engine field, will have to give up the 2,000-pound-thrust turbojet and 1,000-hp turboprop areas.

Because of fear of tipping off its competitors, Continental A. & E. is reluctant to discuss the general areas and ratings of the gas turbine engines it is now studying. And it is equally remiss about other types of engines than gas turbines, preferring to say only, "We are working on other types of engines but their applications are classified."

Whether this means that Continental has such power plants as ramjets, rockets, pulsejets and others under study is not readily clear. However, it is a reasonably safe assumption that Continental has not overlooked an opportunity to move into research on other power plants for aircraft, missiles and helicopters.

• One indication of the way things are moving is a research contract A. & E. currently holds from the AF for studies of solid fuels—a project which could be tied in with the company's production of engine starters but may also be associated with rockets.

Reciprocating Engines

And while A. & E. concentrates its research and production on gas turbines and other more advanced engines, Continental Motors is busily continuing output of reciprocating engines for

utility and executive aircraft. Among them:

• Beech's Bonanza, which uses either a 205-hp E-185-11 or a 225-hp E-225-8.

• Beech's T-34A for the AF and and T-34B for the Navy will employ a 225-hp O-470-13.

• Cessna's L-19A for the Army and OE-2 for the Marines, which use a 213-hp O-470-11 and a 260-hp O-470-2 respectively.

• Cessna 170B and 172—145-hp C-145-2.

• Cessna 180 and 182—225-hp O-470-J.

• Cessna 310—Two 240-hp O-470-Bs.

• Cessna CH-1 helicopter (just ordered by the AF for the Army as the XH-41)—26-hp FSO-470-A.

• Mooney M-18C—65-hp A-65-8.

• Taylorcraft Model 20—225-hp O-470-J.

• Looking at the picture another way, seven airframe manufacturers in the Aircraft Industries Association's Utility Airplane Council shipped a total of 2324 aircraft during the first four months of 1956. More than half of them, or 1,343 of the planes, were powered by Continental engines.

Package Powerplants, Too

• In addition to piston aircraft engine production at Muskegon, Continental Motors is also producing the Packette line of unit package powerplants, containing five models ranging from 34 to 220 hp. There are two PC series Packettes, similar to Continental's C-series aircraft engines and the PE series, which are comparable to the E series aircraft engines.

Usable in any climate ranging from the equator to the North Pole, the Packette line serves in many ways: Examples:

• PC-30 (34-hp) is the major component of the ACF-Brill A-1 generator.

• PC-60 (70-hp) is employed in the Greer Hydraulics R-1-5000 hydraulic

test stand, the Greer D-1 hydraulic test stand, the F-6 refueling truck built by Standard Steel Works and The Heil Co. and the F-7 refueler, made by Butler Manufacturing Co.

• PE-90 (110-hp) is an integral part of the B-10-B generator built by Wolverine Diesel Power Co. and the O-10 crash truck produced by Marmon-Herrington Co. and American LaFrance-Foamite Corp.

• PE-150 (175-hp) powers Beech Aircraft Corp.'s C-26 generator.

• PE-200 (220-hp) is used in American LaFrance-Foamite's O-11 crash truck.

Therefore, both Continental Motors and Continental A. & E. are vital segments of the nation's aircraft engine manufacturing potential. Although not in the same league with such power plant giants as Pratt & Whitney, Allison, General Electric, Curtiss-Wright and Westinghouse, Continental is quite content with its present role. ♦♦♦

Bergaust Joins AAP As Missiles Editor

Erik Bergaust, an authority on rocket propulsion and guided missiles, has been named Missiles Science Editor of



BERGAUST

American Aviation Publications, it was announced by Wayne W. Parrish, Editor and Publisher.

Bergaust's diversified background includes authoring books on satellites and flight and contributions to design of vertical takeoff aircraft. His book, "Satellites," due off the press this month at Hanover House (Doubleday) is the first to be published in this country on coming space satellite vehicles.

A native of Oslo, Norway, he served as aviation editor of *Aftenposten* and was founder and first president of Norwegian Helicopter Society and that country's rocket society. He now is a U.S. citizen, has served as a project engineer for Design Service Company, Ft. Belvoir, Va., and Douglas Engineering Co., Detroit, as well as doing contract work for Army and Navy in the fields of chemicals, gases and propellants for rockets and guided missiles. He holds a degree in chemistry.

Bergaust recently was awarded honorary membership in Convertible Aircraft Pioneers for his contributions to VTOL. He also is vice president of the Washington, D. C., section of American Rocket Society.

Prior to joining AMERICAN AVIATION, he was rocketry and missiles editor of *Aero Digest* magazine.



Air Force Chooses Aero products Propellers FOR LOCKHEED C-130 HERCULES

USAF's first Turbo-Prop transport — the versatile C-130 Hercules — now is being equipped with the proved team of Aero products Propellers and Allison Turbo-Prop engines.

A program of extensive research and testing of Aero products turbo-propellers for the Hercules was conducted by the Propeller Laboratory at Wright-Patterson Air Force Base. In a period of five months, four qualification tests were made with a total of over 900 hours of running time.

Aero products Propellers were chosen on the basis of these tests and of enthusiastic reports by pilots of MATS' 1700th Test Squadron who recently completed a successful flight evaluation program with Allison-powered aircraft.

In an eleven-month period, the 1700th accumulated 3000 hours of flight test time on two Convair YC-131C aircraft powered with YT56 engines and

Aero products Propellers. Within one day each of the two aircraft was flown 23 hours and 10 minutes out of the 24, and in the final four months of the program each aircraft was flown an average of eight hours per day. During this evaluation program, the propeller overhaul time was raised to 1000 hours. This program effectively demonstrated the unmatched dependability of the Allison-Aero products Turbo-Prop package.

The Aero products Propeller blade is of hollow steel construction, having solid steel ribs integral with the thrust side of the blade. No filler material is required in the hollow cavity. It is heat-treated to C30-C36 hardness, with

an average tensile strength of 150,000 psi—providing the maximum abrasion resistance attainable on present-day propeller blades.

Allison Turbo-Prop power gives the Lockheed C-130 the ability to fly cargo faster and at less cost than any other combat transport.

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have declared, "battles
could be won or lost
on the radar-
scopes of our early-
warning planes...
and their mission
would change
from sentry duty
to that of combat
command post."

With each ominous technological advance in aerial warfare by potential aggressor nations, the maintenance of a round-the-clock early-warning system becomes increasingly vital. That's why the USAF's RC-121D and the U. S. Navy's WV-2 SUPER CONSTELLATION sister ships—distinguished by huge radomes atop and below the fuselage—have been flying day-night surveillance missions in all kinds of weather, around the calendar.

Carrying 6 tons of radar gear, these Lockheed SUPER CONSTELLATIONS are pressurized and air-conditioned to provide 75-degree cabin comfort, for a 31-man crew, when outside weather is minus 60. Powered by four Wright 3250-h.p. turbo-compound engines, these picket patrol veterans operate at altitudes over 25,000 feet, if necessary, and at speeds up to 300 mph.

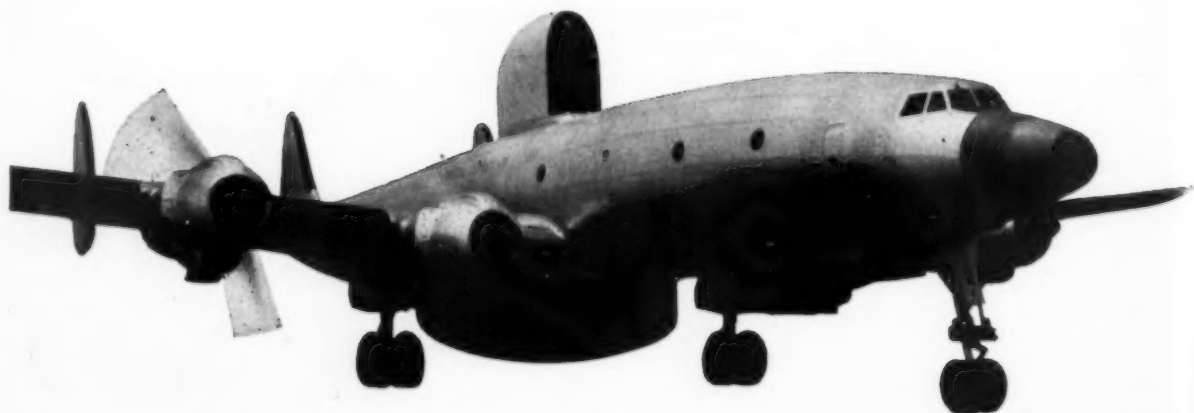
Lockheed developed the antenna reflector assembly in the belly-radome. (From an altitude of 10,000 feet an RC-121D or WV-2 can radar-scan an area of 45,000 nautical square miles.)

Only Lockheed produces long-range early warning radar planes—a tribute to the SUPER CONSTELLATION's famed dependability and to Lockheed's leadership in long-range patrol aviation.

Lockheed

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NACA Unveils \$33-Million Windtunnel

Cleveland facility permits testing of ramjets and turbojets at speeds to Mach 3.5 altitudes up to 160,000 ft.

By JOSEPH S. MURPHY

CLEVELAND—The nation's research capability was given a \$33-million boost up to speeds of Mach 3.5 and altitudes of 160,000 feet here when National Advisory Committee for Aeronautics unveiled its newest windtunnel.

The facility is a 10-by-10 foot "Unitary Plan" supersonic tunnel at NACA's Lewis Flight Propulsion Laboratory. Already in operation since mid-May, it permits aeronautical engineers, to prove out, for the first time, the design of complete engine and nacelle combinations for future high-speed aircraft.

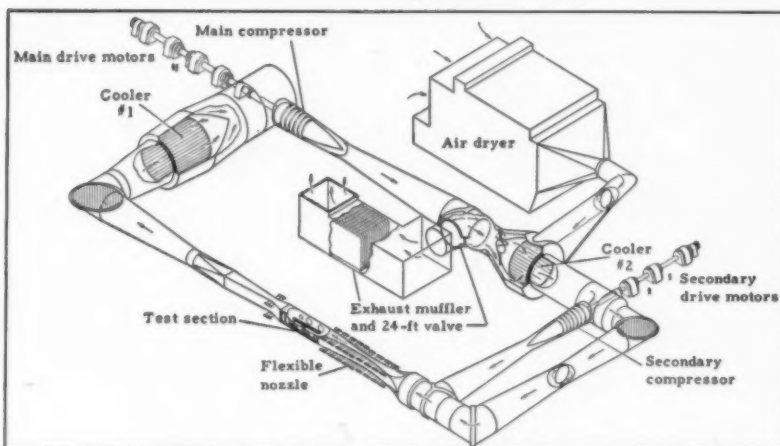
Testing with the new facility got under way last month with hot burning trials on a 16-inch diameter ramjet engine. Among models to follow are a 19-inch diameter "cold" ramjet (for engine inlet research) and a 28-inch operating ramjet, also for "hot" tests. Lewis officials said the test schedule for the new tunnel is already booked 15 months ahead and will include such newer jet engines as the General Electric J79 in addition to ramjets.

• **Operating range** of the facility extends from Mach 2 to 3.5, making it an ideal research tool for both turbojets and ramjets. The former, although in the past considered efficient only to speeds up to Mach 1.5, have now broadened their potential into the complete range between Mach 2 and 3. Similarly, the role of the ramjet gains momentum in this same speed range, giving the new NACA tunnel a dual purpose in life.

This so-called "Unitary Plan" tunnel is the last of a trio authorized by Congress in 1949 at a cost of \$75 million. The others, already in operation, are a 6-by-6 foot model at Langley Aeronautical Laboratory, Virginia and an 8-by-8 foot tunnel at Ames Aeronautical Laboratory, California. Their costs were \$15,000,000 and \$27,000,000.

Whereas the Langley and Ames tunnels are intended for aerodynamic testing, the Lewis installation is more versatile. It can be used either in closed circuit for aerodynamic tests or on an open-end cycle for combustion propulsion research. Simulated altitudes can be varied from 49,000 to 160,000 ft. in closed-circuit tests and from 56,000 to 87,000 ft. in open-end runs.

High speed airflow for the new Lewis tunnel is produced by two compressors, a main compressor used alone



Overall layout of NACA's new 10-by-10 ft. supersonic test facility capable of testing full-scale turbojets and ramjets to speeds of Mach 3.5, altitudes of 160,000 feet.

for test speeds from Mach 2 to 2.5 and a secondary compressor which combines with the main unit to handle speeds up to Mach 3.5.

• The main compressor is an 8-stage unit of 20-foot inlet diameter driven by four General Electric 37,500-horsepower induction motors mounted in tandem on a 40 in. diameter, 108 ft. shaft. The secondary compressor has ten stages, a 15-foot inlet diameter, and is powered by three G.E. 33,334-hp motors.

Tunnel airflow is brought up to supersonic speeds at the entrance to the test section by flexible wall nozzle containing some 125 tons of stainless steel. Wall construction consists of 1½ in. thick stainless sheet 10 ft. wide and 78 ft. long. Nozzle throat can be varied from 0.933 ft. to 5.92 ft. and positioned to an accuracy of .005 in. A bank of 27 screw jacks move each of the 20-ton wall sections a maximum of 2.5 ft. and the change from maximum to minimum opening takes 25 minutes.

Other major tunnel components include:

• An 82-foot high air dryer that houses 1,900 tons of activated alumina to dry incoming air to a dew point of -40°F. It absorbs water at the rate of 1.5 tons per minute, which NACA says equals the drying power of 12,000 household clothes dryers.

• A 900-million BTU-per-hour cooler that dissipates heat generated by the tunnel and test articles. It maintains constant tunnel temperature at 120°F.

• Altitude simulation provided by

two exhausters located near flexible nozzle (see sketch). Each unit is rated at 2,000 hp, is of 8-cylinder design with a 40-inch diameter and 14-inch stroke.

• A Schlieren optical system that "observes" and photographs airflows. A closed-circuit television system permits control-room technicians to monitor flow conditions while a test progresses.

• A Remington Rand Central Automatic Digital Data Encoder (Cadde) that speeds the processing of test results. Through a system of recording on magnetic tape, reprinting on paper tape via automatic typewriters in the control room, and conversion to graphic form by automatic plotters, NACA expects test computations will be available within 30 seconds after a reading is taken. This compares with delays of as much as three weeks for similar data using past methods.

Individually, the test speeds and altitudes possible with the Lewis tunnel are not entirely new to NACA. Past propulsion tests using pressure tanks, either by direct engine coupling or the free-jet approach, have made such research possible.

What the new facility brings to NACA, however, is the ability to go a step beyond these past devices. It not only has the high-speed, high-altitude potential, but adds the capability of testing full-scale engines up to five feet in diameter. And it does this while permitting full reproduction of engine/aircraft mating effects, a factor of rapidly mounting importance in researching tomorrow's aircraft. ♦♦♦

Propulsion Is Biggest Headache For Vanguard Engineers

By ERIK BERGAUST

General Electric propulsion engineers have run into a series of problems. Their Vanguard earth satellite vehicle rocket engine has not yet reached the production stage because of "quality control problems" experienced during test runs.

AMERICAN AVIATION has learned that the GE first-stage engine so far has not reached a burning period of more than 50 to 75% of the 141-second period that the motor is designed for. On several occasions burnout came after only 70 seconds of running. Considerable damage to the engine is said to have been experienced.

GE engineers have been eager to use a propellant combination recipe of their own, approximately 95% gasoline, 4% alcohol and 1% silicone oil. The latter is used for chamber flow cooling.

The specific impulse obtained through the use of this propellant combination—with liquid oxygen as oxidizer—presumably is satisfactory. And it is not likely that the engine failures experienced so far are caused by the propellants, but rather, by a poorly designed injector head, resulting in a mixture ratio discrepancy and foul burning.

This is no new problem to rocket engineers. As a matter of fact, these difficulties are normally anticipated in any new rocket engine development program. However, it may take the GE engineers some time to lick the problem.

In order to obtain a perfect mixture ratio, and complete burning, numerous variations of propellant combinations might be tried. Indicative of this trend is the fact that engineers closely connected with the Vanguard project now refer to the first-stage rocket as a "hydrocarbon fuel rocket" and not a "gasoline rocket"—although gasoline, of course, is a typical hydrocarbon fuel.

• **Propulsion data** for the propellant combination suggested by the GE engineers are about the same as for the classic alcohol-liquid oxygen recipe used in larger missiles. A gasoline-liquid oxygen combination ordinarily requires a mixture ratio of 2.5 (oxidizer to fuel), while an alcohol engine operates under a ratio of 1.3 to 1.5.

Otherwise, performance for the two combinations are almost identical: exhaust velocity is approximately 7,780 ft./sec., specific thrust is about 240 sec., characteristic velocity about 5,500 ft./sec. Under a 300 psi chamber pressure (which is normal), chamber temperature is about 5,500 degrees F. for the

Performance of Conventional Alcohol/Liquid Oxygen vs. Gasoline/Liquid Oxygen

Oxidizer and Fuel	Chamber Pressure, psi	Mixture Ratio (Oxidizer to Fuel)	Exhaust Velocity ft/sec	Specific Thrust, sec	Characteristic Velocity, ft/sec	Chamber Temperature, °F
LOX and gasoline*	300	2.5	7,780	242	5,540	5,470
LOX and alcohol	300	1.3-1.5	7,000	240	5,500	5,100

*(Vanguard main-stage engine type propellant)

gasoline combination and 5,000 degrees for an alcohol engine.

It is quite possible that GE engineers will try to "boost" the oxidizer for the Vanguard by adding to the liquid oxygen one of the chlorine family elements. By no means is the last word spoken in the final choice of propellants for the first-stage engine.

Possibly the most interesting aspect of the satellite engine development is the fact that Armour Research Founda-

tion is said to have submitted to the Vanguard people a proposal to use liquid ozone as oxidizer for the first-stage engine. In some cases the theoretical exhaust velocities obtained by use of liquid ozone are as much as 25% higher than those obtained with conventional liquid oxygen.

Super-Propellant

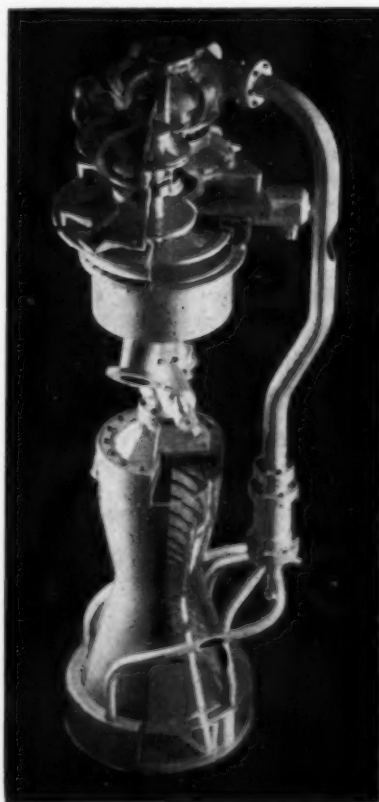
• The "secret" development of a pure and "safe" liquid ozone has been reported by Gerald M. Platz of the ozone technology group at Armour Research Foundation, Illinois Institute of Technology. The product, which is claimed can safely be made in bulk, would prove a major step forward in the development of rocket propulsion of the future, if the claims for it hold up.

But ozone is possibly one of the most hazardous and explosive elements to handle; the past history of ozone research has been full of reports of spontaneous, unpredictable explosions. The new liquid ozone, nevertheless, is said to be 100% pure, and supposedly it can be produced without mishap.

The ozone development is considered very significant, indeed, by rocket engineers, and it is quite likely that the "new" oxidizer will be tried out shortly. However, this does not mean that the use of liquid ozone will solve the problems the GE engineers are facing today.

The Vanguard project is rather pressed for time, and one might assume that GE engineers would want to perfect their engine without seeking the most extreme remedies. So far, it is not anticipated that the propulsion problems will delay the Vanguard project further, although GE is understood to have a considerable way to go before it can safely put its engine into actual production.

It is not remarkable that Aerojet-General Corporation, builder of the second-stage Vanguard engine also is said to have experienced failures during test running.



Half-scale model of General Electric satellite-type rocket engine. Quality control problems are understood to be connected with incomplete burning because of burnout; the combustion chamber in spots may melt away and vaporize.



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No 'Wonder Drug' for R&D Lead Times

By HENRY P. STEIER

Despite the headlined emphasis on dollars and manpower as the means for keeping ahead in the technology race between the U.S. and U.S.S.R., some top-ranking members of industry and the Air Force have generally agreed emphasis should be on better use of what we have.

This conclusion was voiced by participants in a forum on how to accelerate research and development in aeronautical electronics held in connection with the recent National Conference on Aeronautical Electronics in Dayton, Ohio.

Acknowledging that there is "no magic pill" than can be taken to shorten R&D time, Brig. Gen. Victor R. Haugen, director, Wright Air Force Development Center, said high temperature, strength, radiation-resistant materials and complexity are typical problems that make aeronautical electronics the "longest lead time items."

He cited the Technical Program Planning Documents made available to contractors last year as an incentive to science and industry to adopt a "we-are-in-it-together" attitude. He cautioned the electronics industry not to be "faint-hearted" about these needs and to find out what is needed by using TPPD.

• The AF is looking for less Wright Field approval items and more of the "I'll back it up" type of attitude. Haugen suggested that the industry should "not be bashful about suggesting administration of the AF R&D program."

The AF, he said, is looking into procedures for improving contractual effort on systems, sub-systems and equipment with the objective of holding contractors more responsible for engineering and management of R&D programs.

Basic Research

William H. C. Higgins, director of Military Electronics Development, Bell Telephone Laboratories, Inc., forum moderator, called for close attention to the fact that serious technological weakness is impending in the field of basic knowledge.

This is because new ideas have been depleted, especially those collected during and following World War II. The dearth of basic ideas for application to developments has reached a point described by Dr. Douglas H. Ewing, vice president, David Sarnoff Research Laboratories, Radio Corp. of

America as a "cleared cupboard of basic research."

Ewing said a successful weapon development program has its roots in the research laboratory, and the work is "long-term and not predictable." Sometimes results are unanticipated, but very useful. In these ways research is different.

• Main ingredient of research is "freedom," Ewing emphasized. Pointing to the records of successful research laboratories, he asked for recognition that "research is people." These, he said are closely akin to the artist or philosopher, and are most productive in an atmosphere of freedom. "Without freedom there are no ideas," he insisted.

This philosophy of research administration has been successful at RCA,

if there is lack of progress. Continued support would be given over a long period of time.

• The second proposal calls for establishment of a research fund for "targets of opportunity." These would be limited size projects whose funding could be backed immediately as soon as basic knowledge possibilities became evident. Delays caused by fiscal year considerations would thus be circumvented.

To back up this handling of basic research a central agency would be established to support research—of the genuinely basic type—into new phenomena and techniques. "Only in this way can we guarantee the needed weapons," Ewing says.

There is a vast body of ineffectually



Forum members of the National Conference on Aeronautical Electronics discussed ways and means of accelerating R&D in this field of technology. Seated far left is Moderator, William H. C. Higgins, director of Military Electronics Development, Bell Telephone Labs., Inc. Others, left to right, are: Brig. Gen. Victor Haugen, director Wright AFDC; Dr. Douglas H. Ewing, vice pres., David Sarnoff Research Laboratories, RCA; Julian Sprague, pres., Sprague Electric Co.; Thomas Meloy, pres., Melpar, Inc.; Dr. Cleo Brunetti, director of engineering, Mechanical Division, General Mills, Inc.; Dr. Robert J. Shank, vice pres., Hughes Aircraft Co.

and other companies with successful research projects know the same thing, Ewing said.

In the light of these concepts, AF procurement leaves "something to be desired," Ewing added. Since research teams are most productive in an atmosphere of working freedom, he suggested three programs for future attacks on getting the know-how.

These call for establishment of broad research contracts giving authority for broad aims in such typical fields as high-frequency, high-temperature and transistors, with only the general performance requirements stated. Freedom to explore would require leaving out a time schedule for delivery.

Budgetary handling would be done so that funds would be allocated on the basis of work progress, and would permit the military to withhold funds

tapped manpower and facilities awaiting use to do the present job on research and development. This is how Dr. Cleo Brunetti, director of engineering, Mechanical Division, General Mills, Inc., appraised the facilities and manpower situation.

He called attention to the present procurement policy under which eligibility for prime contracts is related to technical competence sufficient for the contract size. Only about three dozen companies that can take on prime contracts exist in the U.S. Total sales per company is about 100 million and each employs about 10,000 people.

• Next in line for defense business are a few hundred companies not big enough to handle prime contracts but capable of handling parts of systems. These employ 500 to 10,000 people.

(Continued on page 51)



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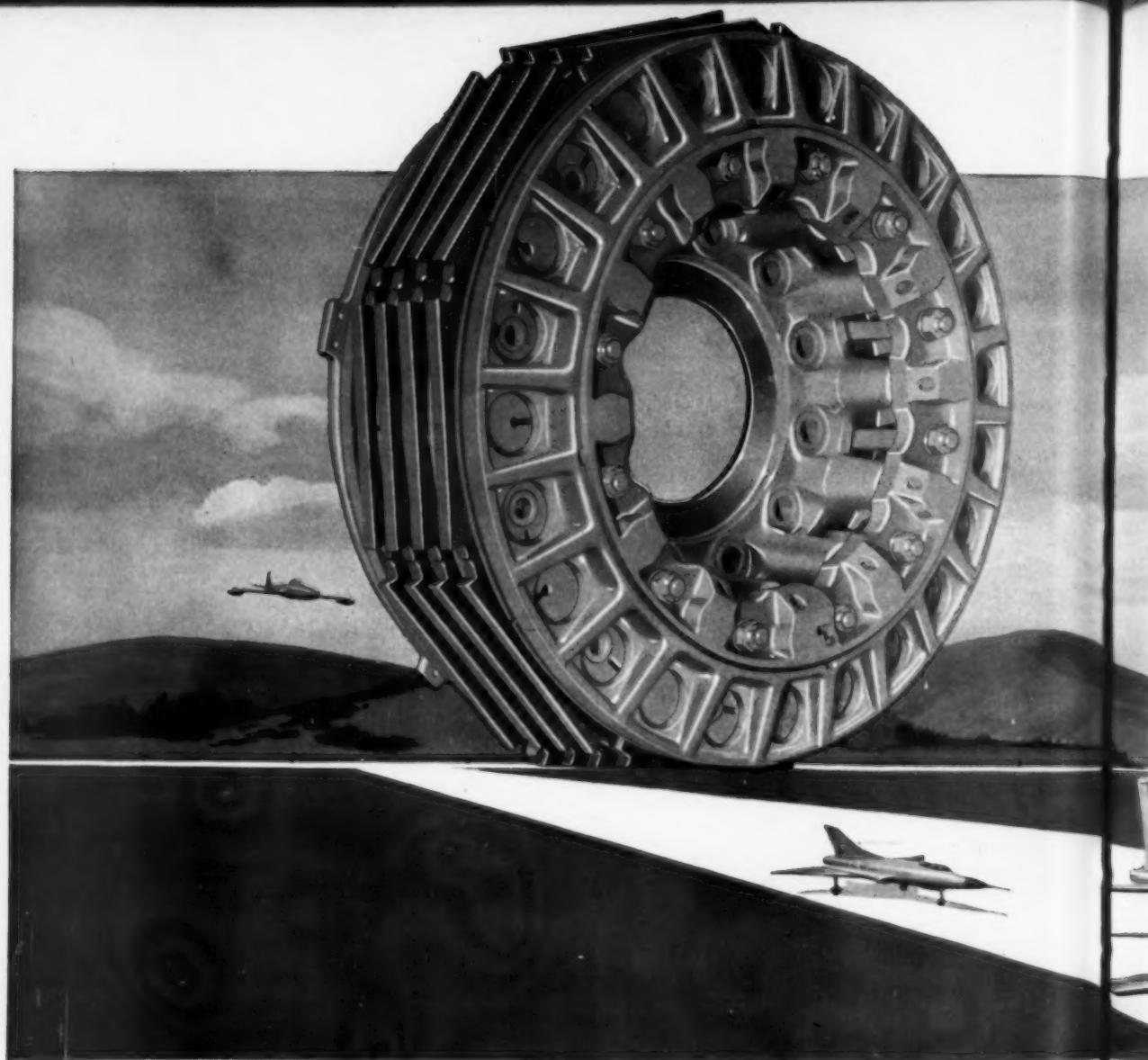


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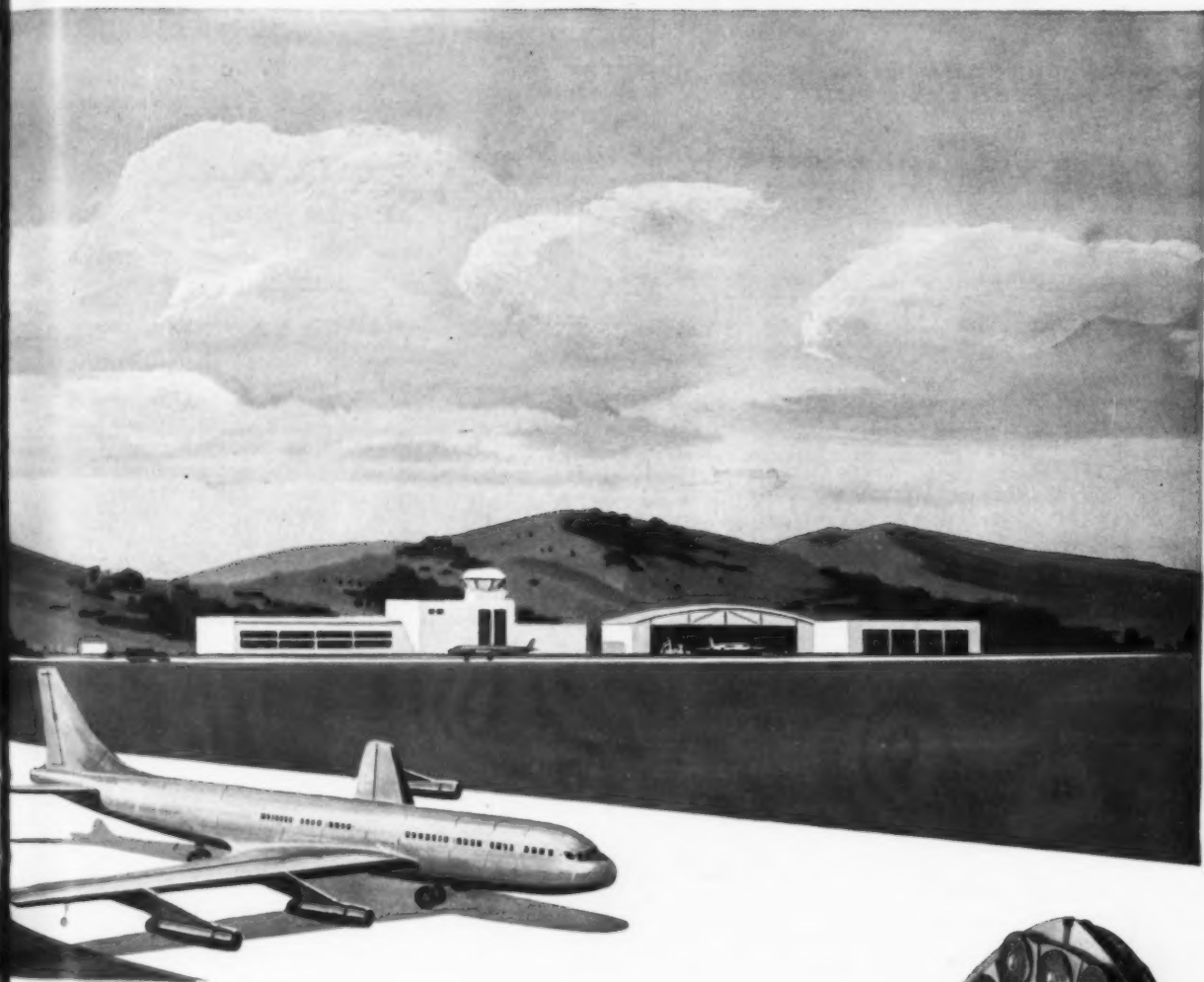
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(Continued from page 46)

Their business volume per company is \$5 to \$10 million.

Following these in size are the approximately 3,000 electronics companies that handle components. Prime contractors have freedom to determine specifications and the smallest have leeway in specifying components and assembly designs.

Brunetti contends the middle-size companies are caught in the middle without any particular say-so on specification. They rely on sub-system contracts. At present about 60 per cent capability to produce a system is required of prime contractors. He proposes that 70 to 90 per cent can be subcontracted successfully.

• **Medium-sized companies** would be happy to invest more in R&D, and have a total number of topflight people to do the job that probably exceeds the total number among the biggest companies. However, Brunetti said, medium-sized companies investing in R&D want a return on their investment. In lieu of this they spend money on manufacturing capability. An important factor in the R&D issue is the ratio between the military production dollar volume and the gross national volume, which is over ten times higher. Consumer product production is attractive to medium-sized companies. Military R&D must be made equally so.

• **Brunetti proposes** that these companies re-examine their areas of interest in all fields and determine not how many fields they can be good in, but in which they can be the best.

These companies would be happy to be relieved of bidding on systems and sub-systems if a carefully examined selective system were set up as part of procurement policy.

This system would be backed up by an advisory service to the companies as a means of giving them "need-to-know" information that would help them to become specialists. It would point out new technical areas for development. This would be a streamlined extension of the AF Technical Program Planning Document service.

Also, weapons system contractors would bring in these specialized companies early in project planning stages, and perhaps prepare them for sharing production as well as R&D.

Longer Working Hours Suggested

• **Thomas Meloy**, president, Melpar, Inc. wants the manpower situation to be attacked by increasing efficiency of engineer usage. This, he said, is not a dollar problem but one of husbanding hours. He suggested longer working hours of 44 to 48 hours a week. This

ARDC to Be Transferred To Andrews AFB

Headquarters of Air Research and Development Command will be transferred from Baltimore to Andrews AFB, Md., on the outskirts of Washington, D. C., USAF has decided.

The site of ARDC's headquarters has been a matter of controversy for months. USAF originally favored Wright-Patterson AFB, O. Air Secretary Quarles indicated, however, that transfer to Andrews will permit better coordination of research with the other services, NACA and other agencies in Washington.

would increase manpower 10 to 20 per cent.

Duplication of effort is a very serious problem, he believes. To solve the problem of insufficient scientists and teachers, there should be an exchange of scientists between industry and the universities. These men would help teach and give Ph.D. reviews.

Meloy suggested that for electronics personnel, the Institute of Radio Engineers act as a clearing house that would keep lists of men who are available for this part-time work.

• **A novel method** was proposed to avoid duplication of effort through information exchange. Under this proposal, the Armed Services Technical Information Agency (ASTIA) would code information taken monthly from research contract activities, and then process and sort the data by electronic data-processing machines. This information would be available to contractors on request.

ASTIA is a tri-service project for interchange of scientific information between branches of the Department of Defense. It is an agency of the AF under the Air Research and Development Command. ASTIA prepares monthly bulletins of information on available reports. However, under Meloy's proposal, information would be more specifically categorized for electronics and other specific fields.

• **Meloy figures** if 50 per cent of duplication could be eliminated it would mean a 50 per cent saving in manpower. However, an ASTIA spokesman said its problem is a "dollar problem" for facilities and one of technical manpower to do the editing job.

Gen. Haugen said a decision has not been reached on whether companies cleared for Technical Program Planning Documents can get ASTIA information for which it is not cleared.

Higgins, moderator of the forum, advised against putting too many men

on a given job. The curve of time-to-develop against number-of-engineers-used on the specific job would not show the time was decreased by adding men, he said. Too many men results in too many alternate approaches to the job and this wastes time. Hard-headed management is needed.

Ideas into Hardware

An important aspect of the R&D picture is relationship of the state-of-the-art to production of a weapons system. The time interval between discovery of knowledge and its application is ordinarily very long.

• **Dr. Robert J. Shank**, vice president, Hughes Aircraft Co., warned that serious errors can be committed at technical levels when the state-of-the-art does not support a system project. Since such a "tour de force" as the Manhattan project can be afforded only once in a decade, he said, we are working under a handicap in system development where changes in design are incurred by the hundreds as new ideas are made operational in hardware.

For this reason, product application of basic ideas can be greatly accelerated by a more positive R&D program. For every small expenditure on the state-of-the-art, much economy is gained at the system level, Shank said. Without this back-up of needed information, system development is risky and intermittent.

Years would be cut off development cycles provided R&D is bolstered. Shank said he backs up the idea of a National Advisory Committee for Electronics (NACE). This would be similar to the National Advisory Committee for Aeronautics. Such an organization gets around the security blanket and has access to wide information sources.

• **The evolution** of electronics into the present \$9-billion giant it is, and its growing application to commercial and military aspects of 20th Century technology as a full-fledged science, deserves consideration of a government-sponsored basic research organization such as NACE.

The 3,000 electronics companies in the U.S. do not by-and-large have free access to basic research discoveries. Their contributions to the technology could be materially enhanced by the right to free use of information from an organization such as NACE. ♦♦♦

WADC Tech Director

Dr. Lloyd A. Wood has been named technical director of Wright Air Development Center's directorate of research. He will provide scientific and technical direction over the center's aero medical, aeronautical research, electronics components and materials laboratory.



F-86 Sabrejets and H-13 helicopter of the 15th Fighter Group, Niagara Falls, N. Y.

A MATTER OF *Minutes...*

Only minutes for U. S. Air Force interceptors to get in the air and on target . . . and minutes, too, for a Bell H-13 helicopter to be at the scene of a possible emergency.

In defense, as in rescue, time can be all-important. And Air Defense Command pilots in fast-moving jets or ever-alert helicopters fully realize that minutes *can be the difference* between the success or failure of a mission.

When an unidentifiable blip appears on the radar screen, the nation depends on its interceptor pilots to run a check miles high in the sky. And pilots who may have to ditch in the water or make a forced landing, depend on helicopters to find them and get them back to base.

The pattern for such current operations was set in Korea where helicopters like the Bell H-13 rescued more

than 25,000 wounded troops and hundreds of pilots, many of whom were forced down behind enemy lines. The maneuverability, flexibility and reliability of the helicopter is an important adjunct to the Air Force in this supersonic age.

BELL
Aircraft CORPORATION

Ft. Worth, Texas • Buffalo 5, N. Y.

**Young Men! Your Future Begins Now...
in the U. S. AIR FORCE**

New Products

CABLE TESTING MACHINE

Hewitt & Faust Mfg. Co. has developed a cable-assembly proofing machine capable of testing cables up to 7,500 lbs. pull. It was designed for accurate testing of cables and fittings in the aircraft industry and is being used by Convair-San Diego, among others.

Cycling of the machine is automatic. Tension holds up to 180 seconds.

Circle No. 180 on Reader Service Card.

TRANSISTORIZED FUEL GAUGE



The Liquidometer Corp. has developed what it believes to be the first transistorized aircraft fuel gauge capable of operating at 100°C. This is said to result in increased accuracy and reliability at high-temperatures.

Using silicon transistors, the gauge is less than half the size of current vacuum tube models. It operates as an integral part of a capacitor-type measuring system.

To meet fuel-measurement needs of jet aircraft that carry auxiliary tanks, company has also designed a kit consisting of an indicator (1½ in. in diameter), a transistorized power unit and the required number of sensing units for each tank.

Circle No. 168 on Reader Service Card.

ALTITUDE CONTROL

AiResearch Manufacturing Co., division of The Garrett Corp. has launched its entry as a producer of aircraft altimeters with a new precision control said to sense changes in altitude as slight as 15 inches.

A barometric type control, the AiResearch unit is designed to respond to altitude variations in less than one-quarter of a second. At 60,000 ft. it reportedly will register changes of as little as 20 ft.

Initial design is intended to sense variable static pressures and relay the results to an aircraft's autopilot. However, the unit lends itself to imminent development of a highly accurate visual altimeter, company engineers say.

Besides altitude control, the device

Is your Jet Engine RPM Measurement Accurate???

The NEW B&H Instrument

TAKCAL

- COMPACT
- LIGHT
- RUGGED



• • • Reads Jet Engine Speed to Guaranteed Accuracy of 10 RPM in 10,000 RPM ($\pm 0.1\%$)

The inter-relation of RPM to efficiency and thrust in jet engines is fundamental. Proper adjustments for maximum thrust, engine life and safety of operation can be made only upon accuracy of instrumentation.

The new B&H TAKCAL incorporates a refinement of the frequency meter principle. It operates in the low (0 to 1000 cps) range, reading the frequency of the tachometer generator on a scale calibrated in percent RPM corresponding to the engine's RPM. In addition, the TAKCAL checks the tach system. The TAKCAL circuit and tachometer are parallel so that readings can be made simultaneously to determine the accuracy (or inaccuracy) of the aircraft's tach system. The TAKCAL operates during the engine run to properly set up engine controls for maximum economy and safety.

The TAKCAL's component parts are identical with those used in the J-Model JETCAL Analyzer. They are here assembled as a separate unit tester and for use with all earlier models of the JETCAL Tester.

The TAKCAL operates accurately in all ambient temperatures from -40°F. to 140°F. Low in cost for an instrument of such extreme accuracy, it is adaptable to application in many other fields.

Explosion-proof TAKCAL for special applications. Measures 200 to 7500 RPM, direct reading, with $\pm 0.1\%$ accuracy.



West Coast Office: 427 E. Grand Ave. El Segundo, Cal.

For full information write or wire

B & H INSTRUMENT CO., INC.
3479 West Vickery Blvd., Fort Worth 7, Texas

Circle No. 21 on Reader Service Card.

At Your
Service...

Hydrospin

*A few of the typical shapes
of metal parts which have
been Hydrospun.*



Take Advantage of This Power Spinning Process and Cut Your Manufacturing Costs

A Cincinnati Hydrospin machine is now in operation at Kaiser Metal Products, Inc., and is available to missile, jet engine and other manufacturers for development and production work.

Under high compressive forces, rollers form an inexpensive flat blank or simple preform to the shape of a rotating mandrel, usually completing a part in one pass. Movement of the roller brackets is controlled by hydraulic tracer and makes possible irregular wall thickness and curved wall shapes. Strength characteristics are improved and finish is excellent.

Savings Take Many Forms

Forming by this economical method obsoletes many chip cutting operations with resulting savings in labor, material and machines. One manufacturer has made savings of 100 lbs. of critical high temperature alloy in one jet engine part alone. Another development on a missile part shows savings of 40% in material over

draw die method and saves weight of the finished part by control of wall thickness.

A wide range of metals has been successfully Hydrospun and, as the above photograph shows, an unlimited variety of tubular, conical and hemispherical shapes is possible. Ask us about ways to put this Hydrospin to work for you in solving your manufacturing problems on hard-to-make, highly stressed parts. We can show you how to produce a better part at a definite cost saving. Write for brochure today. Address Dept. B.



This Cincinnati Hydrospin, one of the few now in operation, may be the answer to your production problems.

Design Engineers: Take advantage of controlled wall thickness possible by this process and consider redesign for ultimate strength and weight savings.

KAISER METAL PRODUCTS, INC.
BRISTOL, PA.

Circle No. 22 on Reader Service Card.

NEW PRODUCTS

features a rate-of-descent control that will correct aircraft rate of descent through the autopilot during approach to landing.

Circle No. 135 on Reader Service Card.

MISSILE FAN



A two-inch-diameter cooling fan developed by Rotron Manufacturing Co. for missile applications weighs only four ounces and moves 35 cfm air at 2-in. static pressure. At free delivery output is 58 cfm.

Fan design is vane-axial with the electrical rotor and air-moving impeller integrally cast in one piece. Fan turns at 20,000 rpm and is wound for 400-cycle use only—either 200 volt 3-phase or 115 volt single phase. Length is 1½ in.

Circle No. 156 on Reader Service Card.

FUSED SILICA

Corning Glass Works has developed a fused silica glass suitable for high-pressure and high-temperature uses, as in windtunnel windows.

Fused silica is said to have unusual physical properties, such as high resistivity and low dielectric loss, high ultraviolet transmission, high stability under X-ray and gamma radiation and high dimensional stability. It may be used at temperatures to 950°C and intermittently to 1,250°C and will sustain severe thermal shock.

The company says fused silica has no equal as an insulator for very high voltages.

Circle No. 161 on Reader Service Card.

MINIATURE PUMPS

Vickers Inc. has developed a new series of miniature oil-hydraulic pumps for limited-life airborne applications, as in missile hydraulic systems and motor-pump assemblies that supply emergency power on aircraft.

They are said to have unusually high power/weight ratios. Under conditions of optimum system-operating pressure and maximum design speed, certain models are capable of developing more than 6 hp per lb.

Pumps are miniature versions of

AMERICAN AVIATION



ROTOL TURBO-PROPELLERS ARE FITTED
TO ALL VICKERS VISCOUNTS NOW IN AIRLINE OPERATION
AND HAVE COMPLETED
OVER THREE-QUARTERS OF A MILLION FLYING HOURS



THE MAJOR AIRLINE OPERATORS
USING ROTOL PROPELLER EQUIPMENT INCLUDE:

Aer Lingus
Air France
British European Airways
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ROTOL TURBO-PROPELLERS HAVE ALSO BEEN SPECIFIED
FOR OVER 200 MORE VISCOUNTS NOW ON ORDER



ROTOL
Limited

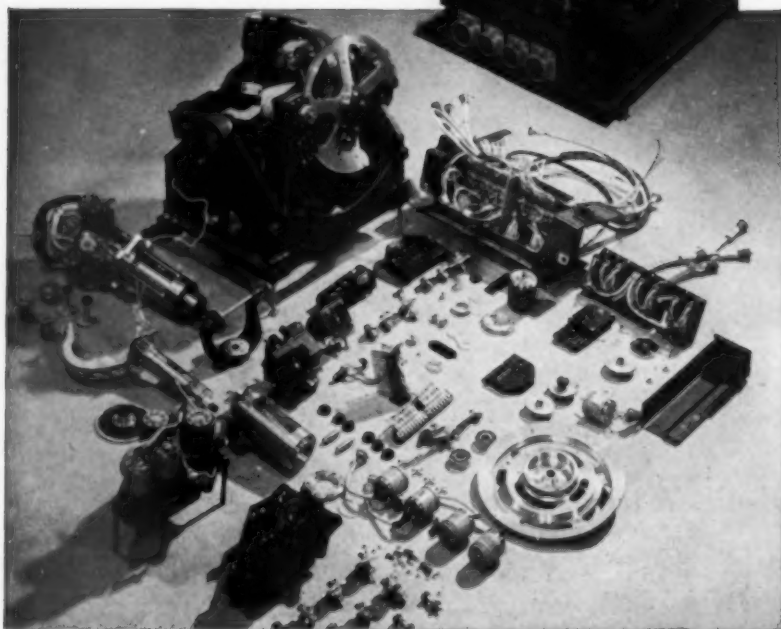
AN ASSOCIATE COMPANY OF
ROLLS-ROYCE LTD. AND BRISTOL AEROPLANE CO.

U. S. A. Representative • Vernon Crudge • Room 1501 • 630 Fifth Avenue, New York 20

Circle No. 23 on Reader Service Card.

Can you use help

with
precision headaches
like this?



Let General Mills work them out for you

Right now our systems engineering people and our factory can be at your service if you need volume piece parts or assemblies such as

- electro-mechanical systems or components
- fine-pitch, instrument-type gears
- precision parts, cutting, grinding, finishing
- industrial or military optical assemblies

Right now you can utilize the experience of our creative engineers and precision production plant—the same men and machines that have handled prime and sub-contract work like the bombing system computer above, the B-47's Y-4 bombsight, and similar complex systems. And of course we offer full laboratory and environmental testing facilities.

LET US BID on your specific requirements today. Save time, cut costs and eliminate the worrisome problems you face in recruiting competent engineers and skilled production hands. We have them now . . . and can rush delivery of parts or whole packages in quantity, on time, to meet strict military specs.



ASK FOR FREE NEW BOOKLET covering complete manufacturing capacities and capabilities. Write, wire, or phone Dept. AMA6, 1620 Central Ave., Minneapolis 13, Minn., STerling 9-8811.

**MECHANICAL DIVISION
OF General Mills, Inc.**

Circle No. 34 on Reader Service Card.

NEW PRODUCTS



the standard Vickers line. They are enclosed in a compact aluminum housing. Pumps with strokes up to 15° are available.

Circle No. 169 on Reader Service Card.

TWO-WAY SOLENOID VALVES



Aircraft Products Co. offers a new line of two-way, solenoid-operated shut-off valves for 3,000-psi service, designed for extremely low leakage in the closed position. They are available in standard sizes for 1/4-in., 3/8-in. or 1/2-in. hydraulic tube systems.

Series 6100 is basically a 3/8-in. valve, also available with 1/4-in. ports. Series 6200 is basically a 1/2-in. valve, also available with 3/8-in. ports.

Of special interest to aircraft engineers is the fact that the design employs an inverse poppet which allows for a wide range of flows in either direction without affecting the operating characteristics of the valve.

Circle No. 170 on Reader Service Card.

CIRCUIT ANALYZER

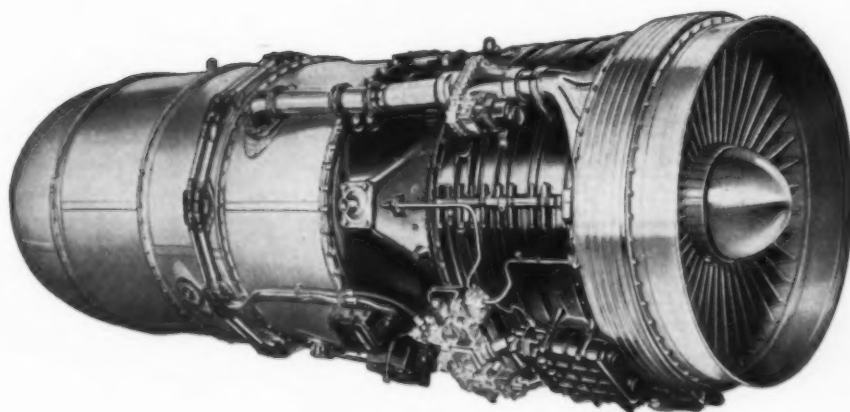
Latest edition to the line of automatic electrical circuit analyzers produced by Dit-Mco, Inc. is the Model 144NX which tests up to 144 circuits in a matter of seconds. It is designed expressly for military use and intended for testing complex electrical systems in aircraft, missiles, radar, computers, servo-mechanisms and fire control systems.

Circle No. 131 on Reader Service Card.

(Continued on Page 59)



HIGH THRUST • LIGHT WEIGHT
LOW CONSUMPTION



ROLLS-ROYCE
CONWAY
BY-PASS JET ENGINE

ROLLS-ROYCE LIMITED • DERBY • ENGLAND

REPUTATION IS BUILT ON PERFORMANCE



For more than a quarter of a century, leading airlines throughout the world have been using Air Associates seat belts. Foolproof, simple to fasten and comfortable, these belts have proven themselves—beyond doubt—for performance and long service.

The latest refinement in seat belts is Air Associates Model M-7500, custom-made of full-bodied, nylon-rayon. Woven for maximum grippage, it provides improved behavior characteristics as well as longer life and increased attractiveness. Webbing is available in six standard colors: dark blue, dark green, beige, gray, tan and black. (Specials on request.) New satin-chrome buckle is designed with disc cut-out for airline insignia. M-7500 meets CAA specification TSO-C22B.

Write for Air Associates Seat Belt Catalog 22 for complete information on the M-7500.



Manufacturing Division
66 Industrial Avenue
Teterboro, New Jersey

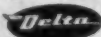
Aviation Supplies Division
Teterboro, New Jersey
Chicago, Illinois
Glendale, California
Dallas, Texas
Atlanta, Georgia
Miami, Florida



PHILIPPINE AIR LINES

የኢትዮጵያ የአየር መንገድ
ETHIOPIAN AIR LINES INC.

Delta-C&S Air Lines



LAN
LINEA AEREA NACIONAL • CHILE



The Flying Tiger Line Inc.

NORTH AMERICAN AIRLINES

NATIONAL GREEK AIRLINES TAE

PACIFIC NORTHERN AIRLINES, INC.



NORTH CENTRAL AIRLINES INC.

SOUTH AFRICAN AIRWAYS

SLICK Airways Inc.

TAN airlines

TRANSPORTES AEREOS NACIONALES, S. A.

SOUTHWEST AIRWAYS COMPANY

TRANS-AUSTRALIA AIRLINES

WEST COAST AIRLINES

TATA Incorporated

TRANS-CANADA AIR LINES

TRANS-TEXAS Airways

WESTERN AIR LINES



AMERICAN AIRLINES

ARGENTINE AIRLINES

BRANIFF AIRWAYS

BRITISH GUANA AIRWAYS (Govt)

BRITISH OVERSEAS AIRWAYS CORPORATION
BOAC

BRITISH WEST INDIAN AIRWAYS

CALIFORNIA EASTERN AVIATION, INC.

Capital Airlines

COMPANIA DE AVIACION "FAUCETT", S.A.

CENTRAL AIRLINES Inc.



CENTRAL AFRICAN AIRWAYS CORPORATION

Continental AIR LINES

EASTERN AIRLINES, INC.



KLM • ROYAL DUTCH AIRLINES

NORTHWEST AIRLINES, INC.

LAI
LINEE AEREE ITALIANE S.p.A.

Northeast Airlines

PAN AMERICAN WORLD AIRWAYS SYSTEM

RIDDLE airlines inc.

TRANS-TEXAS Airways

NEW PRODUCTS

NON-GLARE INSTRUMENT LIGHT



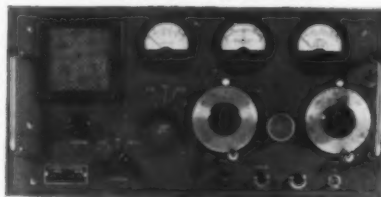
Bolt-lite, a device for providing non-glare lighting for aircraft instruments, is being produced by the Glar-Ban Corp.

Unit combines a mounting bolt, light and filter that permit light to be directed evenly on dials of various types of instruments, including standard-sized and miniature. Model 5602 Bolt-lite illuminates a standard instrument. Model 5602M provides lighting for miniature instruments.

Bolt-lite uses the AN3140-327 bulb, 6-volt or 28-volt type, and a red light filter.

Circle No. 171 on Reader Service Card.

TELEMETRY RECEIVER



Nems-Clarke has announced a crystal-controlled double conversion telemetry receiver, type 1400, that operates in the frequency range of 216 to 245 mc.

I.F. bandwidths of 500 kc or 100 kc may be chosen from the front panel. Narrow bandwidth I.F. is intended for PWM/FM and PTM/FM signals with a nominal deviation of ± 50 kc. A peak frequency deviation meter is included with the receiver.

Circle No. 157 on Reader Service Card.

HIGH-PRESSURE AIR STAND AND BOTTLE CART

The ACE-36 is a 5,000 psi, mobile high-pressure air stand offered by Accessory Controls & Equipment Corp. as a source of dry air for use in starting jet aircraft, testing landing gear, inflating tires, and other applications.

Also available is the ACE-37 high-pressure bottle cart, which has a storage capacity of 18,000 cu. in. of air.

The ACE-36 is rated at 16 cfm and

JUNE 4, 1956



PC-60
4-cyl. 70 hp.

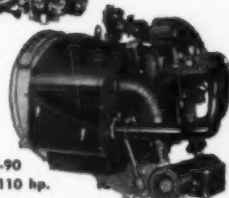
are at YOUR SERVICE

THESE ROUND OUT THE
PACKETTE LINE

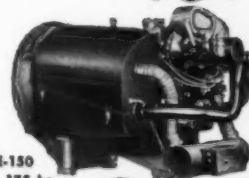
These five all-climate Packettes, the standard package power plant for all types of ground service equipment, provide output from 34 to 220 hp, in combination with that dependability which has made Continental aircraft engines pilots' first choice. Automatically governed by the applied load, for any specific application. These power plants offer wide interchangeability of parts with the basic models from which they are developed. Those with prospective need for compact, dependable power, engineered to operate under equatorial heat or at 65° below zero, are invited to write for information.



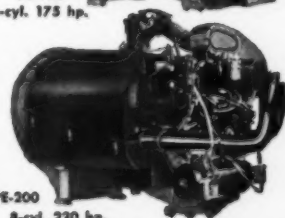
PC-30
2-cyl. 34 hp.



PE-90
4-cyl. 110 hp.



PE-150
6-cyl. 175 hp.



PE-200
8-cyl. 220 hp.

CAREERS FOR ENGINEERS

Continental Motors and its subsidiaries have numerous openings for engineering personnel interested in challenging careers in gas turbine and reciprocating engine development. For information, address: Engineering Personnel Department, 12800 Korchival Avenue, Detroit 15, Michigan.

Continental Motors Corporation



AIRCRAFT ENGINE DIVISION

MUSKEGON • MICHIGAN

Circle No. 26 on Reader Service Card.

NEW PRODUCTS

is equipped with the ACE-1 dehumidifier, which dries the output air to a dewpoint of -65°F . Desired dryness is selected by adjusting the thermostat.

Circle No. 181 on Reader Service Card.

FLIGHT RECORDER

Gateway Manufacturing & Development Corp. is marketing an instrument that introduces the "install and forget" concept of recording flight data for aircraft crash analysis.

The Gateway unit continuously records, stores, then erases such flight data as acceleration, airspeed, altitude, etc. on

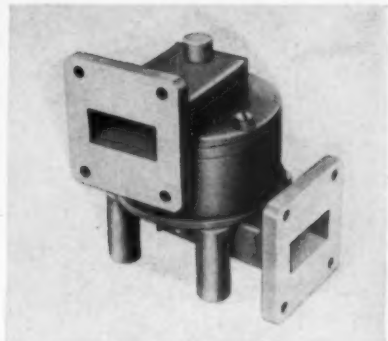


a rugged metal plate with no reloading required. In event of a crash, it pro-

vides a flight history for a period of minutes preceding the incident.

Circle No. 152 on Reader Service Card.

MICROWAVE ROTARY JOINT



Airtron, Inc. has developed a new microwave rotary joint for aircraft applications. The unit is available in unsealed and pressurized versions, and is used with a $1.250 \times .625$ waveguide.

VSWR is less than 1.10 over a frequency range of 8500 to 9600 mc. Variation of VSWR is said to be negligible throughout angular travel. Total seal life is in excess of 10 million revolutions, according to Airtron.

Circle No. 159 on Reader Service Card.

MINIATURE ADF



A miniature automatic direction finder weighing 19.1 pounds is now being produced by Aircraft Radio Corp. climaxing more than a year of flight tests. The ARC Type 21 ADF operates in the 190- to 1,750-kc spectrum and uses a 3-band superheterodyne receiver.

Receiver dimensions are 10 in. by $5\frac{1}{4}$ in. by $4\frac{3}{4}$ in. Weight is 7 lbs. Overall system weight of 19 lbs. includes receiver, power unit, loop, control unit and indicator.

Circle No. 153 on Reader Service Card.

TIEDOWN KIT

A kit containing all accessories necessary to tie down an aircraft has been placed on the market by the Rupert Parachute Co.

Kit contains three tiedown stakes that can be screwed into the ground, two 10-foot and one six-foot pieces of

16 Passenger Twin Pioneer

—can bring cheap air transport to any part of the world which can provide a hundred yards or so of reasonably level ground.



A fixed wing, 16-passenger or 4,000 lbs freight carrying aircraft that can take-off in 85 yards and land in 90 yards. The Twin Pioneer cruises at 140 miles an hour . . . Range 620 miles . . . Maximum speed 180 miles per hour . . . and lands at bicycle speed.

The Twin Pioneer aircraft is specially designed to meet the need of difficult territories where airfields can neither be constructed nor afforded and for short range inter-city air services where much time can be saved by operating from strips close in to the centres of cities.

SCOTTISH AVIATION

PRESTWICK AIRPORT, Ayrshire, SCOTLAND • Telegrams: AERONAUTICS • PRESTWICK

Circle No. 27 on Reader Service Card.

NEW PRODUCTS



line, and a two-foot bar to turn the stakes.

Canvas kit measures 3 in. in diameter and 21 in. in length, weighs less than 8 lbs.

Circle No. 182 on Reader Service Card.

CLEANING MACHINE



Magnus Chemical Co., Inc. has introduced a new cleaning machine called the "Roll-O-Matic Metal Laundry" that automatically washes, rinses, rust-protects and dries small metal parts such as acorn nuts, screw machine parts, fittings, etc.

The machine removes oils and loose chips, thus eliminating hand-scrubbing and air blow-off. Washing and anti-rusting solutions may be salvaged for re-use.

Circle No. 183 on Reader Service Card.

GLASS SILICONE FORMICA

A new glass silicone grade of Formica laminated plastic, designated G-7-2, is said to possess great "hot strength," better color fidelity, less water absorption characteristics, lower wet power factor and increased dielectric strength.

The properties of G-7-2, according to the Formica Company, are especially useful in guided missiles, radar, radio and TV, motors and generators and other electrical/electronic applications. It is recommended for printed circuitry. Technical data is available.

Circle No. 184 on Reader Service Card.

Product Briefs

• **Standard Automation Products** has announced a new cryogenic (ultra-low temperature) process for production of high-precision, machined plastic parts for aircraft.

Circle No. 162 on Reader Service Card.

• An airborne refrigerator for airline and military transport galleys has been introduced by Nordskog Co. Called Aero-Kool, the unit has a capacity of 7 cu. ft., weighs 135 lbs.

Circle No. 164 on Reader Service Card.

• **Safway Steel Products, Inc.** is producing a heavy duty portable crane designed specifically for rapid handling

of aircraft engine and heavy component changes.

Circle No. 165 on Reader Service Card.

• A new power supply, designed for use with any combination of its airborne VHF equipment, has been developed by Dare, Inc. It provides jacks for "plug-in" addition of Dare communications or navigation components, eliminates junction boxes, external resistors and relays usually required.

Circle No. 166 on Reader Service Card.

• A tar-rubber compound called SCCO Hot Poured Joint Sealer has been announced by Studebaker Chemical Co. for filling expansion joints in airport runways for jet operations.

Circle No. 167 on Reader Service Card.



Dear Beth:

No, I don't mind you flying around with that Mergatroid McSquirtle from next door, providing you take certain precautions. Airplanes are safe but I just don't trust McSquirtle. In case he lives up to his reputation as a ladies' man, you better always wear a parachute. Keep this letter in your chemise as a reminder: If worst comes to worst, make for the door like a scalded coon, curtsy coolly, and leap.

I also insist that, if you're going to ride in it, Mergy's plane be serviced by Southwest Airmotive. Tell him that all old business pilots have found it's really less expensive and a lot more sensible to go First Class. After 24 years, SAC has the know-how and equipment to do flying's finest job on engines, accessories, aircraft, props, instruments, refueling, and new-parts distribution.

And SAC has Experience! In the first half of '56 alone, 40 Southwest employees tallied up 300 years of total service there. No other comparable operator can make a statement like that about its workers.

Now, honey, you're NOT experienced, even if you are 21, 124 lbs., 5'6", hazel-eyed and red-haired. So w-a-t-c-h that Mergatroid McSquirtle!

Love, *Daddy*

SOUTHWEST AIRMOTIVE

• LOVE FIELD

• DALLAS, TEXAS

Circle No. 28 on Reader Service Card.

People

MANUFACTURING

Burton W. Beers appointed head of flight operations department, Guided Missile Laboratories of Hughes Aircraft Co.

Wayne Goldie appointed director of engineering and sales for Pastushin Industries, Inc.

Bert M. Harsh elected a vice president of Hawthorne Flying Service.

Eugene J. Venaglia named mgr. of the new Microwave Electronics Division of the Sperry Gyroscope Co.

Karel J. (Charlie) Bossart named

chief engineer of Convair's Atlas Program.

Fritz Bingham appointed president of Gremco, Inc.

Louis G. Ralche named factory mgr. of Aeronca Mfg. Corp., Middletown, O.

Edmond H. Leavey elected president of International Telephone and Telegraph Corp.; Max Enderlin appointed aircraft program director for Federal Telephone and Radio Co., division of I.T.&T.

Catherine R. Prentice joins Hill and Knowlton, Inc., as a member of the staff serving the Aircraft Industries Assn.

Dr. Bennett S. Ellefson, Marion E. Pettegrew and Arthur L. Chapman elected vice presidents of engineering

and research, tungsten chemical and parts operations, and manufacturing, respectively, for Sylvania Electric Products Inc.

Northrop Aircraft, Inc. personnel changes: Robert R. Miller from v.p.-administration to v.p. and gen. mgr., succeeded by C. Hart Miller; Richard R. Nolan named v.p.-manufacturing, succeeding Kenneth F. Bowen, resigned; Thomas H. Quale moves to mgr. of the Anaheim division; George Douglas to asst. gen. mgr. of the company.



Miller



Slipper

Michael Cooper-Slipper appointed chief test pilot for Orenda Engines Ltd., Malton, Ontario.

Dr. Charles R. Burrows becomes v.p.-engineering for the Ford Instrument Co., division of Sperry Rand Corp.

F. A. Twomey appointed gen. mgr. of Air Associates' Aviation Supplies Division.



Burrows

James W. Mariner appointed director of national accounts for Brown & Bigelow in the special sales division.

AIRLINES

George L. Bright promoted to director of sales training for Mohawk Airlines.

Capt. Robert E. Rousselot and Allan Wueste elected vice presidents of operations and technical services, respectively, of Civil Air Transport.

Walter W. Coyle named assistant to the vice president and gen. sales mgr., Trans World Airlines.

Enar B. Olson appointed director of administration of Northwest Orient Airlines.

Capt. D. E. Kinkel appointed asst. chief pilot, administrative, of Pan American's Pacific-Alaska division.

John C. Heiner appointed head of Hawaiian Airlines' agency and inter-line sales office.

Joseph W. Shuster named director of labor relations for Western Air Lines.

Ted Cook named personnel mgr. for KLM Royal Dutch Airlines in the U.S.

E. R. R. (Ted) Field appointed mgr. flight operations and Capt. B. A. Rawson, director of flight development for Canadian Pacific Airlines.

Candido Llovera named U.S. operations mgr. of Iberia Air Lines of Spain.

GOVERNMENT

Frank R. Caldwell named chief of combustion controls section at the National Bureau of Standards.

Floyd S. Bryant made Asst. Secretary of Defense (Properties and Installations).

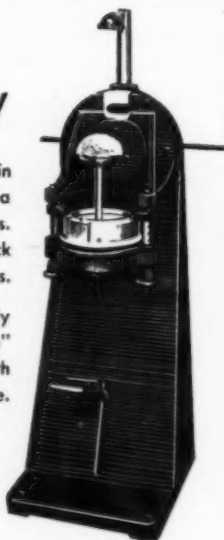
TOOLS...

TO DO THE JOB—*Right!*

You need the right tools to properly overhaul and maintain aircraft engines. Lund offers prompt shipment from stock of a wide variety of Pratt & Whitney and Wright engine tools. The two illustrated are just a sample of what we have in stock—in NEW condition—at a quarter of original factory prices.



Special Tool Kits also supplied quickly for either standard or "tailor-made" engine requirements. "Tool-up" with Lund for lower prices and faster service.



Write or call today—
tell us what you need!

TAM 206

TAM 3146

Years of Personal Performance Are the Foundation of

Lund Aviation, Inc.

230 PARK AVENUE • NEW YORK 17, N.Y., U.S.A.

Millville, New Jersey

Paris, France

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Circle No. 29 on Reader Service Card.

WORLD'S PREMIER AIRPLANE FABRIC

lighter

stronger

smoother

FLIGHTEX

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Leading Manufacturers of

Fabric and Tapes for the

Aircraft Industry

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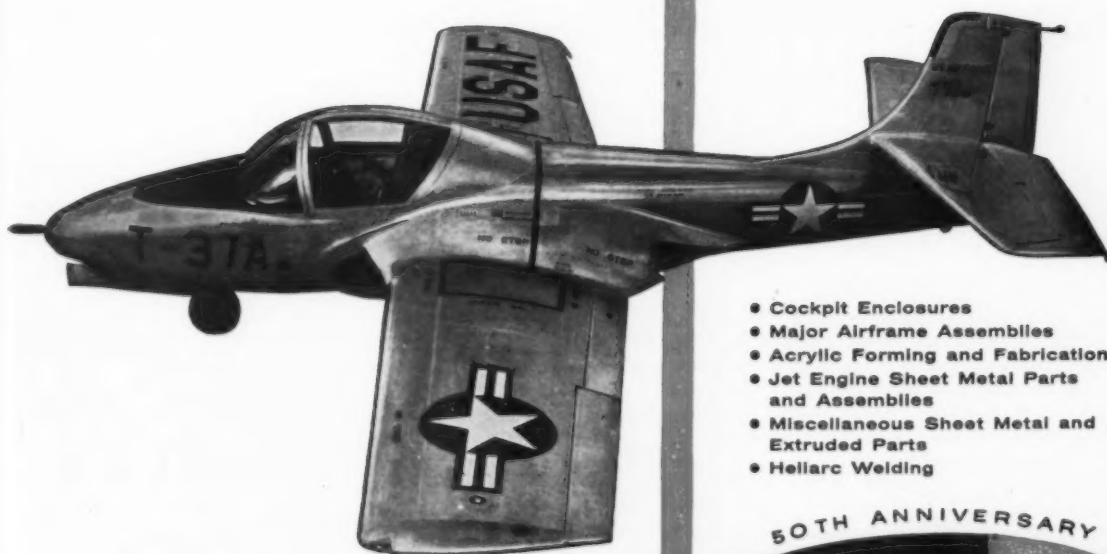
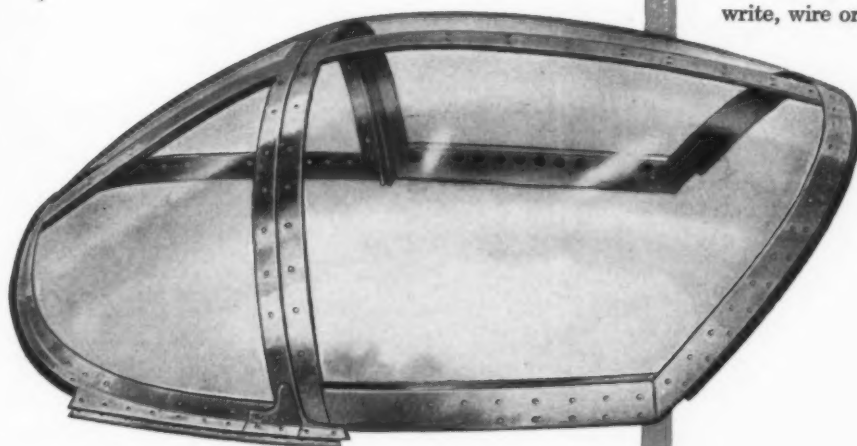
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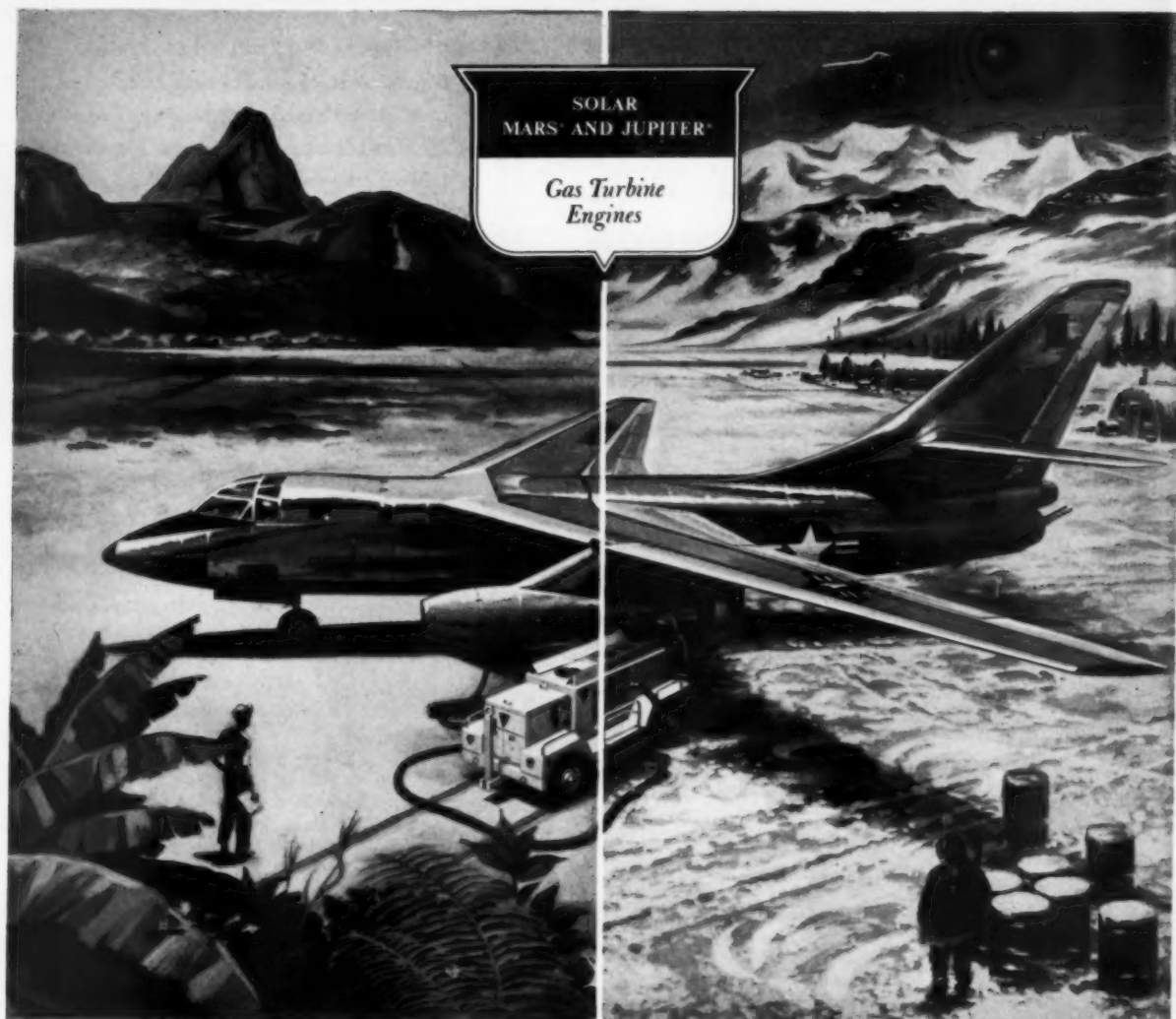


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Airlines Report Salaries Of Top Executives

The following carriers have filed with the Civil Aeronautics Board reports listing the 1955 salaries and other compensation of officers and directors:

Capital Airlines—J. H. Carmichael, pres. & dir., \$52,800 salary, no bonus and indirect compensation; R. G. Lochiel, v.p., treas. & dir., \$33,000 salary, no bonus & indir.; James W. Austin, v.p. & dir., \$30,800 salary, no bonus & indir.; James B. Franklin, v.p., \$28,600 salary, no bonus & indir.; Robert J. Wilson, v.p., \$24,475 salary, no bonus & indir.; Hayes Dever, secy., \$19,250 salary, no bonus & indir.; Charles H. Murchison, chm. exec. com. & dir., \$36,300 salary, no bonus & indir.

Persons other than directors, officers and employees paid more than \$10,000 for personal services were: Adair, Ulmer, Murchison, Kent & Ashby, Jacksonville, Fla., legal, corporate, tax matters & route proceedings, \$66,000; Blaxter, O'Neill & Houston, Pittsburgh, Pa., legal, \$15,064; Lybrand, Ross Bros. & Montgomery, Pittsburgh, Pa., certified public accountants, \$17,540; and Mayer, Freidlick, Speiss & Tierney, Chicago, Ill., legal, \$11,369.

Delta Air Lines—C. E. Woolman, pres. & gen. mgr., \$54,537 salary (up \$6,537), no bonus & indir.; Leigh C. Parker, v.p.-traffic & sales*, \$28,621 salary (up \$3,621), no bonus & indir.; Charles H. Dolson, v.p.-oper., \$28,038 salary (up \$4,038), no bonus & indir.; Todd G. Cole, v.p.-finance & asst. secy., \$24,204 salary (up \$5,537), no bonus & indir.; R. S. Maurer, v.p.-legal*, \$20,288 salary (up \$2,955), no bonus & indir.; W. T. Beebe, v.p.-personnel, \$18,737 salary (up \$2,937), no bonus & indir.; Eric Cocke, v.p.-civil affairs, \$18,587 salary (up \$2,787), no bonus & indir.; T. M. Miller, asst. v.p.-traffic & sales, \$18,587 salary (up \$2,787), no bonus & indir.; R. H. Wharton, asst. v.p.-personnel, \$11,371 salary, no bonus & indir.; Carl H. McHenry, secy.-treas., \$1,338 salary (up \$138), no bonus & indir.; Catherine Fitzgerald, asst. treas., \$6,513 salary (up \$815), no bonus & indir.; R. W. Freeman, chm. bd., \$1,338 salary (up \$1,066), no bonus & indir.

Persons other than officers, directors and employees paid more than \$10,000 for personal services were: Pogue and Neal, Washington, D.C., legal, \$76,716; Arthur Andersen & Co., Atlanta, Ga., auditing, \$13,775; and Powell, Goistein & Murphy, Atlanta, Ga., legal, \$11,500.

Eastern Air Lines, Inc.—E. V. Rickenbacker, chm. bd. & gen. mgr., \$50,000 salary, \$12,859 bonus & indir.; T. F. Armstrong, pres. & dir., \$35,000 salary, \$5,558 bonus & indir.; P. H. Brattain, 1st v.p. & dir., \$32,500 salary, \$7,598 bonus & indir.; S. L. Shannon, sr. v.p. & dir., \$30,000 salary, \$5,385 bonus & indir.; L. P. Arnold, v.p., \$22,500 salary, \$3,969 bonus & indir.; J. H. Brock, v.p., \$20,000 salary, \$2,648 bonus & indir.; M. M. Frost, v.p., \$27,500 salary, \$3,404 bonus & indir.; C. Froesch, v.p., \$15,000 salary, \$2,711 bonus & indir.; William Van Dusen, v.p., \$20,000 salary, \$2,156 bonus & indir.; R. L. Ramspeck, v.p., \$20,000 salary, no bonus & indir.; W. L. Morrisette, v.p., \$17,500 salary (up \$10,079), \$1,141 bonus & indir.; G. A. Smith, 2d v.p., \$6,666 salary, no bonus & indir.; T. E. Creighton, treas., \$17,500 salary, \$2,102 bonus & indir.; F. L. Farley, secy., \$15,000 salary, \$1,566 bonus & indir.; J. C. Warwick, asst. secy., \$8,891 salary (up \$4,504), \$805 bonus & indir.; J. K. Klicar, asst. treas., \$10,250 salary (up \$5,375), \$602 bonus & indir.; E. R. Cook, dir., no fees, \$200 bonus & indir.; P. M. Davis, dir., no fees, \$300 bonus & indir.; G. B. Howell, dir., no fees, \$400 bonus & indir.; H. Knowlton, dir., no fees, \$700 bonus & indir.; W. L. Moore, dir., no fees, \$800 bonus & indir.; S. Peabody, Jr., dir., no fees, \$600 bonus & indir.; P. E. Reinhold, dir., no fees, \$400 bonus & indir.; L. S. Rockefeller, dir., no fees, \$700 bonus & indir.; McGregor Smith, dir., no fees, \$600 bonus & indir.

Persons other than directors, officers, and employees paid more than \$10,000 for personal services were: Gambrell, Harlan, Russell, Moye & Richardson, Atlanta, Ga., legal, \$187,000; Dewey, Ballentine, Bushby,

Palmer & Wood, N.Y.C., legal, \$60,000; Price, Waterhouse & Co., N.Y.C., auditing, \$24,000; H. O. Lyon, Miami, Fla., consultant, \$12,000.

Pan American Grace Airways, Inc.—Douglas Campbell, v.p. & gen. mgr., \$24,000 salary, \$5,000 bonus & indir.; T. J. Kirkland, v.p., \$21,000 salary, \$3,000 bonus & indir.; K. A. Lawder, v.p. & comptroller, \$21,000 salary, \$3,800 bonus & indir.; E. G. Bern, v.p., \$18,000 salary, \$2,250 bonus & indir.; C. S. Collins, asst. v.p., \$13,500 salary (up \$1,500), \$950 bonus & indir.; A. J. Phelan, asst. comptroller, \$13,200 salary (up \$1,200), \$950 bonus & indir.; W. F. Lewis, asst. treas., \$11,750 salary (up \$750), \$600 bonus & indir.; E. E. Spencer, asst. treas., \$10,500 salary, \$600 bonus & indir.

Persons other than directors, officers, and employees paid more than \$10,000 for personal services were: Covington & Burling, Washington, D.C., legal, \$20,450; Price, Waterhouse & Co., N.Y.C., accounting, \$13,300.

Trans World Airlines, Inc.—Ralph S. Damon, pres. (deceased 1/4/56), \$34,999 salary, \$1,000 dir. fees (up \$100), \$29,224 bonus & indir.; Warren Lee Pierson, chm. bd., \$64,999 salary (down \$8,214), \$900 dir. fees (up \$100), \$25,559 bonus & indir.; J. A. Collings, exec. v.p. & dir., \$48,000 salary, \$800 dir. fees (up \$100), \$20,589 bonus & indir.; E. O. Cocke, v.p.-sales & dir., \$34,916 salary (up \$1,916), \$1,000 dir. fees (up \$300), \$14,307 bonus & indir.; A. V. Leslie, v.p.-finance, treas. & dir., \$34,916 salary (up \$1,916), \$1,000 dir. fees (up \$200), \$10,372 bonus & indir.; G. L. Gilmore, v.p.-pub. rel., \$19,916 salary (up \$1,916), \$6,492 bonus & indir.; J. H. Clemson, v.p.-pass. ser. (elected 11/1/55), \$3,958 salary, \$479 bonus

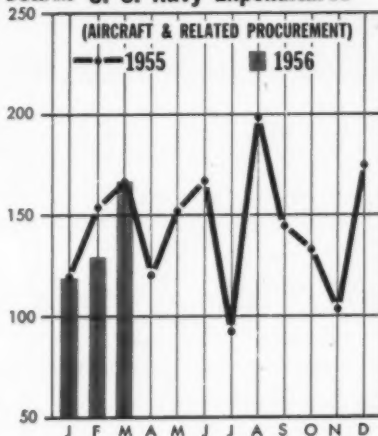
& indir.; D. W. Harris, v.p.-ind. rel., \$21,916 salary (up \$1,916), \$6,767 bonus & indir.; G. H. Clay, v.p. & secy., \$23,916 salary (up \$1,916), \$7,921 bonus & indir.; M. J. Flodinec, controller (resigned 6/1/55), \$24,916 salary (up \$2,916), \$6,409 bonus & indir.; T. K. Taylor, v.p., \$23,916 salary (up \$1,916), \$7,312 bonus & indir.; J. L. Weller, v.p., \$21,916 salary (up \$1,916), \$7,069 bonus & indir.; Fred W. Ayres, dir., \$600 dir. fees (up \$200), \$140 bonus & indir.; John E. Bierworth, dir., \$400 dir. fees (up \$300), \$140 bonus & indir.; Palmer Bradley, dir., \$1,000 dir. fees (down \$200), \$140 bonus & indir.; Powell Croaley, Jr., dir., \$100 dir. fees (down \$200), \$140 bonus & indir.; Noah Dietrich, dir., \$800 dir. fees (up \$600), \$140 bonus & indir.; A. B. Eisenhower, dir., \$700 dir. fees, \$140 bonus & indir.; Oscar F. Holcombe, dir., \$800 dir. fees (up \$200), \$140 bonus & indir.; Sidney Maestre, dir., \$700 dir. fees, \$140 bonus & indir.; M. E. Montrose, dir. (elected 12/13/55), no dir. fees, \$109 bonus & indir.; Harry Rogers, dir., \$1,000 dir. fees (up \$400), \$140 bonus & indir.; Ben-Fleming Sessel, dir., no dir. fees, \$109 bonus & indir.; A. D. Simpson, dir., \$900 dir. fees, \$140 bonus & indir.; Thomas A. Slack, dir., \$200 dir. fees, \$140 bonus & indir.; Loyd Wright, dir., \$300 dir. fees (up \$100), \$140 bonus & indir.

Persons other than directors, officers, and employees paid more than \$10,000 for personal services were: Chadbourne, Parke, Whiteside, Wolf & Brophy, N.Y.C., legal, \$410,375; Haskins and Sells, Kansas City, Mo., auditing, \$54,170; Airport Medical Center, Los Angeles, medical services, \$19,475; Ammann and Whitney, N.Y.C., professional services, \$13,688; Batton, Barton, Durstine & Osborn, Inc., advertising, \$47,565; Brink's Inc., Chicago, protective services, \$16,990;

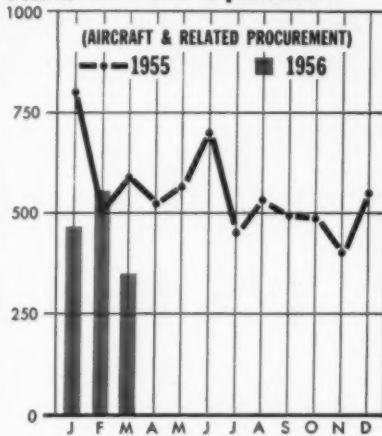
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Pulse Of The Industry

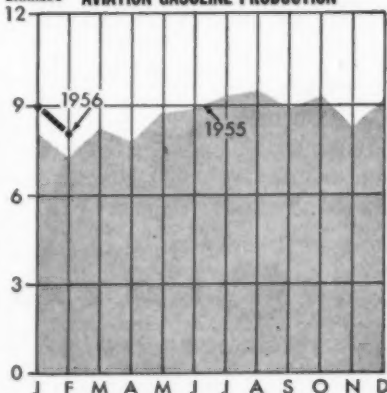
MILLION DOLLARS U. S. Navy Expenditures



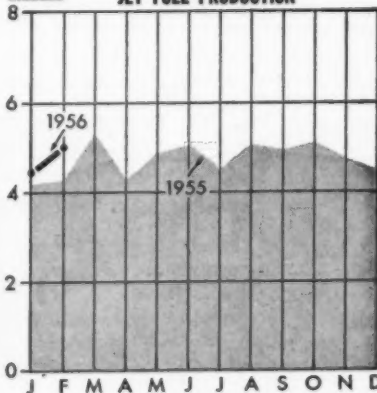
MILLION DOLLARS Air Force Expenditures



MILLION BARRELS AVIATION GASOLINE PRODUCTION



MILLION BARRELS JET FUEL PRODUCTION



*Also director.

JUNE 4, 1956

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(Continued from Page 65)

\$30,500; Merryly Stanley Rukeyser, New Rochelle, N.Y., legal, \$11,000; Trippet, New

West Coast Talk . . . By Fred S. Hunter



New Purolator Separator Filters remove 99.95% of water and 99% of solids from Avgas and jet fuel

99 percent of all solids and 99.95% of the water can now be removed from both Avgas and Jet fuel by Purolator's new Separator Filters. These new Separator Filters are rated — 300 gpm for Avgas; 225 gpm for JP-4, JP-5 kerosene, and 180 gpm for diesel fuel. The military model is Naval Engineering approved and its commercial facsimile performs with the same degree of efficiency.

Purolator Separator Filters more than meet Naval requirements—water removal being 100%, dirt removal better than 99% with differential readings substantially below the maximum limita-

tion of 15 psi—the effluent is clear and water-free.

The Commercial adaptation differs from its military counterpart in that its housing is made of steel with aluminum division plates whereas the Navy requires aluminum bronze throughout. These models can be mounted horizontally in the rear bucket box compartment of refuelers, on carts or in a stationary installation.

For full details, write Purolator Products, Inc., 970 New Brunswick Avenue, Rahway, N. J., Dept. A4-62.

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Rahway, New Jersey and Toronto, Ontario, Canada

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(Continued from Page 65)

\$30,500; Merryly Stanley Rukseyer, New Rochelle, N.Y., legal, \$11,000; Trippet, Newcomer, Yoakum & Thomas, Los Angeles, legal, \$12,160; Theiss, Olson, Mechlenburger, Von Holst & Colman, Chicago, legal (on patents), \$10,626; Holman, Nicklewait, Marion, Black & Perkins, Seattle, Wash., legal, \$11,005; Rohrer, Hibler and Replogle, Chicago, legal, \$12,000; Edwin Shields, Hewitt & Associates, Libertyville, Ill., consultation, \$20,234; Barrington Associates, Inc., N.Y.C., management consultation, \$32,185; Raymond Loewy Associates, Inc., Chicago, designing, \$110,946; Production Management Engineering Associates, Inc., San Francisco, engineering, \$16,831; H. J. Brunner, San Francisco, engineering, \$11,299; Harriman Ripley & Co., N.Y.C., agent fee in connection with debenture purchase, \$180,000.

Pan American World Airways, Inc.—J. T. Trippe, pres. & dir., \$20,000 salary, \$2,350 director's fee; J. C. Leslie, v.p. & dir., \$30,000 salary (up \$1,000), \$16,000 bonus & indir., \$1,100 dir. fee; H. J. Friendly, v.p. & gen. counsel & dir., \$30,000 salary (up \$1,000), \$16,000 bonus & indir., \$1,100 dir. fee; S. F. Pryor, v.p., asst. to pres. & dir., \$29,500 (up \$500), \$15,000 bonus & indir., \$1,650 dir. fee; Franklin Gledhill, v.p. & dir., \$29,000 salary (up \$1,000), \$15,000 bonus & indir., \$1,100 dir. fee; H. E. Gray, exec. v.p.-AD, \$29,250 salary (up \$1,250), \$15,000 bonus & indir.; W. L. Morrison, exec. v.p.-LAD, \$29,250 salary (up \$1,250), \$15,000 bonus & indir.; W. G. Lipscomb, v.p.-traffic & sales, \$29,000 salary (up \$1,000), \$15,000 bonus & indir.; A. P. Adams, v.p., \$26,500 salary (up \$500), \$12,000 bonus & indir.; Erwin Balluder, v.p., \$27,250 salary (up \$250), \$11,000 bonus & indir.; C. M. Young, exec. v.p.-PAID, \$25,750 salary (up \$750), \$10,000 bonus & indir.; H. H. Berke, v.p., \$21,000 salary (up \$1,000), \$9,000 bonus & indir.; R. B. Adams, v.p., \$22,000 salary (up \$1,000), \$7,000 bonus & indir.; H. W. Toomey, v.p., \$20,000 salary, \$2,500 bonus & indir.; A. A. Priester, v.p. (deceased 11/28/55), \$18,222 salary (up \$6,944); R. Lewis, exec. v.p.-dev. & def., \$5,687 salary, \$5,000 bonus & indir.; H. M. Bixby, v.p. & dir. (resigned 7/1/55), \$7,000 salary (down \$7,000), \$3,550 dir. fee; E. M. Goulard, asst. v.p., \$10,500 salary, v.p., \$5,125 (elected v.p. 9/13/55), \$4,000 bonus & indir.; R. S. Mitchell, v.p.-GMRD, \$3,083 salary, \$5,000 bonus & indir.; J. S. Woodbridge, comptroller, \$22,500 salary (up \$500), \$9,500 bonus & indir.; R. G. Ferguson, treas., \$22,500 salary (up \$500), \$9,000 bonus & indir.; H. P. Morris, secy. & gen. atty., \$14,000 salary, \$3,000 bonus & indir.; W. W. Lynch, asst. v.p., \$19,120 salary (up \$760), \$4,000 bonus & indir.; S. E. Kauffman, asst. v.p., \$17,250 salary (up \$250), \$5,000 bonus & indir.; J. C. Cone, asst. v.p., \$16,000 salary, \$5,000 bonus & indir.; W. J. McEvoy, asst. v.p., \$13,000 salary, \$3,000 bonus & indir.; R. P. Monson, asst. treas., \$15,250 salary (up \$250), \$6,000 bonus & indir.; J. E. McGuire, asst. comptroller, \$12,250 salary (up \$6,650), \$1,000 bonus & indir.; E. G. Rothrock, asst. secy., \$11,460 salary (up \$180), \$1,000 bonus & indir.; Josiah Macy, Jr., asst. secy., \$12,400 salary, no bonus & indir.; J. J. Cantwell, asst. secy., \$8,945 salary (up \$85), \$750 bonus & indir.; S. M. Fairchild, dir., \$900 dir. fee; R. V. Fleming, dir., \$1,800 dir. fee; Merrill Griswold, dir., \$1,400 dir. fee; R. L. Hamill, dir., \$1,300 dir. fee; R. W. Howard, dir., \$1,700 dir. fee; D. S. Ingalls, dir., \$1,200 dir. fee; Robert Lehman, dir., \$1,100 dir. fee; E. O. McDonnell, dir., \$5,000 dir. fee; M. T. McKee, dir., \$5,000 dir. fee; J. S. Rockefeller, dir., \$900 dir. fee; W. H. Standley, dir., \$700 dir. fee.

Persons other than directors, officers and employees paid more than \$10,000 for personal services were: Campbell, Brumbaugh, Free & Graves, N.Y.C., legal, \$28,850; Cleary, Gottlieb, Friendly & Hamilton, legal, \$150,719; Dewey, Ballantine, Bushby, Palmer & Woods, N.Y.C., legal, \$18,500; H. Don Reynolds, Scarsdale, N.Y., legal, \$22,500; Roosevelt, Freidlin & Littauer, N.Y.C., legal, \$15,000; Skadden, Arps & Slate, N.Y.C., legal, \$27,837; Steptoe and Johnson, Clarkston, legal, \$28,500; Dickie Raymond, Inc., Boston, advertising, \$19,800; J. Walter Thompson, N.Y.C., advertising, \$65,492; Coombs, Sufferin & Fernald, N.Y.C., accounting, \$65,965; Paul Aiken, Washington, air-mail traffic consulting, \$14,400; George B. Buck, N.Y.C., consulting actuary, \$13,310; Julius Klein, Chicago, public relations, \$12,000; Peter O. Mattel, San Francisco, building contracting, \$17,218; Lowell A. Mayberry, Boston, building contracting, \$34,000; Sanderson and Porter, N.Y.C., engineering, \$18,631. ♦♦♦

West Coast Talk . . . By Fred S. Hunter

- F-107A is souped-up Super-Sabre.
- Douglas engineers working overtime.

NORTH AMERICAN AVIATION'S F-107A, now scheduled for its first flight in July, originally was designated the F-100B. It's a souped-up Super Sabre, in which P&W's new and bigger J75 engine supplants the J57 used to power the other models in the F-100 line, and it also embodies some changes in configuration, notably in location of the air intake in back of the pilot. It promises to be a different-looking airplane.

The F-107 is a fighter-bomber and the higher power is being utilized more to boost load and range than speed. It is not intended to be a competitor of Lockheed's flashy F-104A in the high performance brackets. There are no X or Y models. North American went right into production on the plane on a very small Air Force order. There has been no indication—as yet, anyway—that there may be follow-on orders to make it a real production plane, although no doubt North American is highly hopeful.

Engineering trends—Douglas has had 80% of its engineering department at Santa Monica (this includes the missile division) working a 49-hour week, and the load has been so heavy it has even sub-contracted detail drafting on some phases to outside firms, a practice Douglas normally avoids . . . Southern California Professional Engineering Association may seek to introduce a bill in the California legislature to provide for a state aeronautical engineering license, similar to that possessed by many Boeing engineers at Seattle where the state of Washington has such a provision . . . Just to show the lengths companies have to go to recruit engineers, General Electric's aircraft products department at Johnson City, N. Y., runs ads in the Los Angeles newspapers inviting engineers to call 'em up on the phone collect.

From the west coast viewpoint, it's an open question whether the biggest news lately was the Ford Motor Co.'s abrupt plunge into the weapons systems field through the formation of a new subsidiary, aptly called Aeronutronic Systems, Inc., or the Air Force's cancellation of the

long-range interceptor project.

Only a few weeks ago we speculated on whether Dr. Ernest Krause and Dr. Montgomery Johnson might write another Ramo-Wooldridge success story with their Systems Research Corp. venture. Well, Systems Research

has already become Aeronutronic Systems, Inc., with a \$10,000,000 commitment from Ford for a research and development center, and if that ain't success in itself we'll say it's a real good start.



Hunter

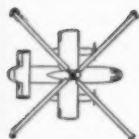
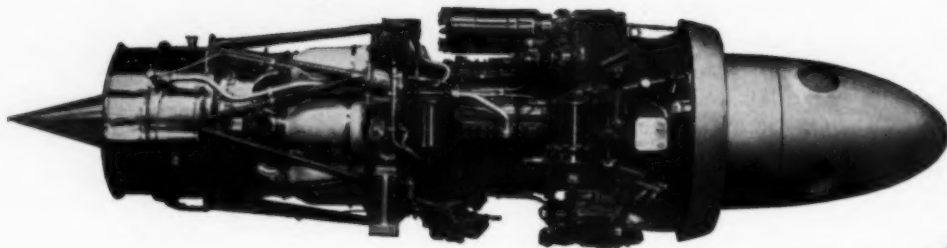
The LRI competition was a Research and Development Command project, but the dope seems to be that the knockout blow was administered by the Air Defense Command by deciding it just didn't want a long-range interceptor. Interest in the LRI had run high in these parts, because three local companies, Lockheed, North American and Northrop, had been the Phase I rivals.

There was the added flavor of Northrop's hope of coming up with a successor to its F-89, which phases out in August. However, Northrop now has another design on which it can center its hopes. This is its supersonic jet trainer. If the trainer clicks, Northrop will be making a lot more planes out at Hawthorne than it would have netted from any LRI contract.

Air Force-Lockheed press showing of the F-104 at Palmdale sprouted such a staggering amount of publicity Lockheed had to measure the clips by the pound. Too many to count. They're still coming in. The F-104's "new look"—or call it the "Kelly Johnson Look," if you like—landed on front pages the nation over. One of the things overlooked by the writers who covered the show at Palmdale—and Lockheed, needless to say, made no mention of it—is the fact that the fancy new fighter has boundary layer control.

Convair's F-102B will be about 100 mph faster than the F-102A . . . It all depends on the viewpoint—Lockheed counts the Convair Sky-lark 600 as a competitor for the Boeing 707 and Douglas DC-8, while Boeing and Douglas regard it as a competitor for Lockheed's Electra.

3 engines of increasing importance



ELAND A Convair 340 aircraft converted to Eland engines will be on demonstration flights in Europe and the U.S. during this year. Another aircraft powered by *Elands* is the Elizabethan, converted for freighter evaluation. Napier *Elands*, fitted with auxiliary compressors for the tip-powered rotor system, will be mounted in Fairey's new large transport helicopter, the Rotodyne.



ORYX Two Napier *Oryx* engines are being mounted in the new Percival P74. Napier worked with Hunting Percival in the development of the *Oryx*, a 750-825 gas h.p. turbo-gas-generator which has been Type Tested at 750 g.h.p. This new Napier power unit eliminates all mechanical transmission.



GAZELLE This 1,260 s.h.p. Free Turbine helicopter engine is another Napier engine which is going places. Two *Gazelles* will be mounted vertically in the Bristol 192, a new twin rotor helicopter, and one *Gazelle* will power the Westland S.58 "Wessex" helicopter which is being adopted by the Royal Navy. The engines are directly connected to the rotor heads, providing mechanical transmission in its simplest form.

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ENGLAND
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AMERICAN AVIATION

Is the by-pass engine all that it is cracked up to be? This question is being raised in airline circles as a result of Trans-Canada Air Lines' decision to order the Conway-powered version of the Douglas DC-8 and of pointed comments on the by-pass engine by a principal competitor of Rolls-Royce, The Bristol Aeroplane Company.

The advantages of the by-pass are well known. They were enumerated in some detail in *AMERICAN AVIATION* of March 26 and more recently were succinctly described by H. W. Seagrim, TCA's General Manager, Operations, in the following words: "Compared with competitive turbojets, the Conway has a lower operating cost, is quieter, cheaper, lighter and gives [the DC-8] a 300/400-mile increase in range—or greater payload if the extra range is not required."

• **Bristol does not go along** with these sentiments. It brands as false "the common thought" that the by-pass has an advantage over the pure jet in fuel consumption. Size for size (i.e., in diameter and air mass flow) the plain jet will have the same, or a better, fuel consumption than the by-pass at a similar thrust," says Bristol. Equally, it asserts, of similar size engines, the maximum and cruising thrusts of the plain jet will always be greater than those of the by-pass.

Finally, knocking down the by-pass' claims for quietness, Bristol declares that "the facts are that engines given the same thrust will make the same amount of noise whether they are plain jets or by-pass units."

• **The Bristol criticism** was not long in being answered by Rolls-Royce. J. D. Pearson, head of the company's Aero Engine Division, declared: "Our analyses show that, assuming the same competence of design, taking the same efficiency for all components, under all conditions, we find in our analysis that the by-pass engine shows a small but significant advantage in terms of specific consumption and weight over the straight jet."

Pearson also brought out a very important point—that when technical differences of assessment are fairly small they tend to be over-ridden by confidence in the manufacturer—confidence not stemming from any sentimental attachment but from the hard facts of experience. There is no doubt that TCA's decision to order the Conway DC-8 resulted as much from satisfaction with Rolls Royce engines in present aircraft (Merlins in the North Star and Darts in the Viscount) as from the potential of the by-pass.

IATA Wrestles with Fare Problems

With the threat of an open-rate situation casting its shadow the International Air Transport Association's fare-setting traffic conferences opened in Cannes, France, May 29. The conference must work out recommended fares for the North Atlantic and Pacific routes to be effective October 1, which will meet the needs of transport economics and satisfy all of the many governments that must approve these fares before they can become effective.

The meeting was convened some four months earlier than usual because of U.S. Civil Aeronautics Board's refusal to approve present fare levels beyond September 31. Other governments had approved them until March 31, 1957.

In a policy statement issued in connection with the Cannes meeting CAB has endorsed Pan American World Airways' proposal for a "truly high-density low-cost transatlantic service" for a round-trip fare of \$391.50 (New York-London). It rejected TWA's proposal for a 15-day, \$350 round-trip excursion fare.

The PAA service would be of the "austerity" type with a 34-in. maximum seat pitch, mandatory five-abreast seating, maximum of two cabin attendants, no liquor service, and modest meal service at the passengers' expense.

CAB also considers that the first-class fare level on the Atlantic and Pacific should go back to the level before April 1, when a 10% increase was introduced, and that airlines desiring to provide sleeper seats should be allowed to charge \$75 per seat.

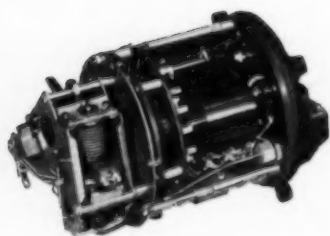
Where sleeper seats and berths are provided, CAB suggests that the upper and lower berth charges be increased to \$100 to \$150, respectively, from the present flat \$55 charge. It recommends no change in the present 10% discount for round trips unless general fare levels are lowered. It is no secret that most foreign airlines and governments do not agree with CAB's views on passenger fares.

CAB is also dissatisfied with the present generic descriptions being used for specific commodity ratings on the North Atlantic. It considers that these should be revised by September 31 to prevent the inclusion of high-value cargo commodities in broad classifications which are rated on the basis of the lowest commodity included in such classifications, thereby reducing revenue. Furthermore, there is likelihood of further revenue loss under the present system since, in CAB's opinion, "adequate enforcement of the proper application of rates is extremely difficult."

French Lightweight Fighter



France's Dassault company is building the Mystere XXIV lightweight fighter as a private venture. Power-plant is a SNECMA Atar turbojet. Two similar models are also being constructed by Dassault—the Mystere XXII with two Turbomeca Gabizo jets and the Mystere XXVI with a Bristol Orpheus.



This is the altitude control used in Honeywell's MB-3 flight control system. It will hold modern supersonic aircraft to within inches of a selected altitude for extended periods of time. Yet, despite its extreme sensitivity, it is only four inches in diameter and weighs only 3.6 pounds. Honeywell, through its ability to design and produce components like this, has made more aircraft flight control systems than any other company in the world.

AERONAUTICAL DIVISION, MINNEAPOLIS-HONEYWELL

Fairchild Aims at Executive Market With F-27 Priced at \$540,000

By LOIS C. PHILMUS

While the local service airlines have led the parade in placing orders for the Fairchild F-27 turboprop transport as a DC-3 replacement, the executive market definitely is being considered by the manufacturer.

Fairchild Aircraft is offering an executive version which would be priced at \$540,000, less interiors, but with more wing fuel capacity for better range than specified for the airlines.

Actually, the F-27 specifications come closer to meeting the paper configuration of the "ideal" business aircraft, specified by the National Business Aircraft Association, than any announced production aircraft.

- Pressurization provides cabin altitude of 8,000 feet at 20,000 feet.

- Speed is expected to top 300 mph, although presently published figure is 280 mph. Increase is expected to result from use of new 12-foot Rotol propeller which will be included on the production aircraft.

- Range of the production plane will hit at least 2,250 miles.

- Fairchild officials predict that the F-27 can solve "several problems" for the business aircraft user: (1) Demand for new transport with good short-field characteristics; (2) need for pressurization; and (3) parts replacement and rising operating costs.

The F-27, Fairchild feels, offers the large corporate user an opportunity to standardize in the multi-engine field in place of the "conglomeration" of converted B-26, B-24, B-25 and PV bombers, Lodestars, D-18s and DC-3s.

- To ascertain the value of the new turboprop for the corporate group, Fairchild retained Ray & Ray, market consultants of Washington, to come up with utilization and cost projections. Assumptions and calculations have been figured at a total of \$560,000 for the aircraft, including \$20,000 for radio and navigation equipment.

Depreciation estimate, based on seven years, is calculated at \$72,000 per year with a 10% residual. Write-off per hour, it is said, would work out to \$180 based on 400 hour annual utilization; \$102.86 for 700 hours; and \$7 for 1,000 hours.

Insurance may cost \$16,800 per year with a 3% hull coverage rate. Cost per hour would be about \$42 for 400 hour utilization annually; \$24 for 700 hours; and \$16.80 for 1,000 hours. Crew salaries for captain and co-pilot are figured

at \$12,000 and \$7,000 respectively with an additional \$5,000 for extra help. Per hour cost, therefore, would be \$60 per hour for 400 hours, \$34.29 for 700 hours and \$24 for 1,000 hours.

Maintenance costs, based on Capital's airlines engine experience and Convair experience, are estimated as follows on an hourly basis: airframe, \$18.28; engine, \$11.80; and other \$3.10 for a total cost of \$33.18. (See table on summary of operating costs for further detail.)

- Another important facet of the Ray & Ray study is the compilation of F-27 performance by flight regimes for selected stage distances as follows:

- Climb for 150-mile trip to the 14,000-foot cruise altitude would take 10.7 min., cover 30 miles and use 320 lbs. of fuel; for 300 to 1,000 mile ranges to 20,000 feet would take 17.6 minutes, cover 51 miles and use 480 lbs. of fuel.

- Descent for the 150-mile trip would take 11.5 min., cover 46 miles and use 150 lbs. of fuel and for the longer trips, 23.5 min., 92 miles and 315 lbs. of fuel.

- Cruise time for a 150-mile trip would take 16.3 min., cover 74 miles at a true air speed of 273 mph and use 394 lbs. of fuel; a 300-mile trip would take 33.6 min., cover 157 miles at a TAS of 280 mph, using 706 lbs. of fuel; a 600-mile trip would take 97.9 minutes, covering 457 miles using 2,054 lbs. of fuel; and a 1,000 mile trip would take 183.6 minutes covering 857 miles using 3,852 lbs. of fuel.

- Take-off and maneuvering for all four stages are estimated at using four minutes and 90 lbs. of fuel.

- Starting and taxiing are figured at six minutes consuming 80 lbs. of fuel.

- Total block-to-block flight time, therefore is estimated as follows: 150-mile stage, 48.5 minutes at a speed of 186 mph using 1,034 lbs. of fuel; 300-mile trip, 84.7 minutes, 213 mph, consuming 1,671 lbs. of fuel; 600-mile trip, 149 minutes, 242 mph, 3,019 lbs. of fuel; and 1,000-mile stage, 234.7 minutes, 256 mph, 4,817 lbs. of fuel.

Production plans for the F-27 are now being readied. Fairchild expects to deliver the first airplane in October, 1957.

The plane will be powered by two Model 506 Mark 511 Dart propjet engines.

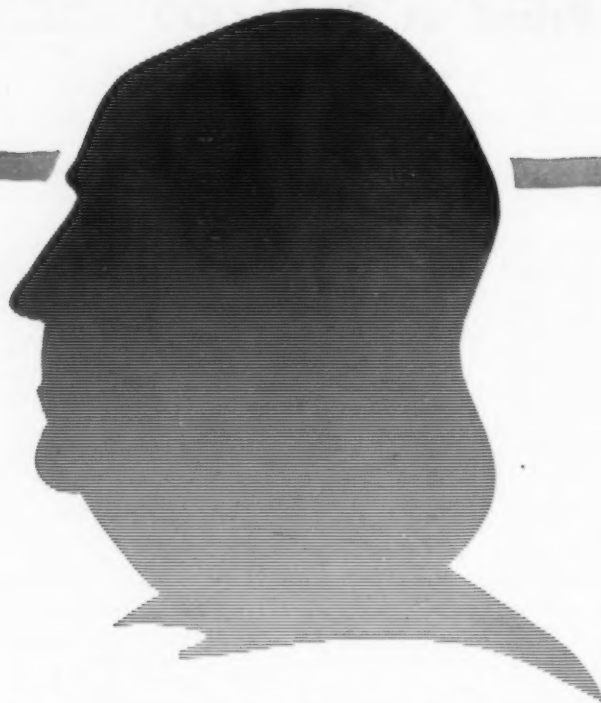
It is of high-wing configuration, chosen for inherent stability, since it does not require much dihedral in wing or horizontal stabilizers. ♦♦♦

Summary of Operating Costs of F-27 as Corporation Aircraft

	SELECTED STAGE DISTANCES			
	150	300	600	1,000
Operating Costs at 1,000 Hrs. Per Year				
Depreciation	51.00	94.44	171.60	274.44
Insurance	11.90	22.04	40.04	64.04
Crew Costs	17.00	31.48	57.20	91.48
Maintenance	23.50	43.52	79.08	126.47
Fuel and Oil	15.51	25.06	45.28	72.25
Total Costs Per Trip	118.91	216.54	393.20	628.68
Per Mile	79.27	72.18	65.53	62.87
Per Hour	167.88	165.08	164.98	164.93
Per Year	167,880.00	165,080.00	164,980.00	164,930.00
Operating Costs at 700 Hrs. Per Year				
Depreciation	72.86	134.92	245.15	392.07
Insurance	17.00	31.48	57.20	91.48
Crew Costs	24.29	44.98	81.72	130.70
Maintenance	23.50	43.52	79.08	126.47
Fuel and Oil	15.51	25.06	45.28	72.25
Total Costs Per Trip	153.16	279.96	508.43	812.97
Per Mile	102.11	93.32	84.74	81.30
Per Hour	216.24	213.43	213.33	213.28
Per Year	151,368.00	149,401.00	149,331.00	149,261.00
Operating Costs at 400 Hrs. Per Year				
Depreciation	127.49	236.11	428.99	686.10
Insurance	29.75	55.09	100.10	160.09
Crew Costs	42.50	78.70	143.00	228.70
Maintenance	23.50	43.52	79.08	126.47
Fuel and Oil	15.51	25.06	45.28	72.25
Total Costs Per Trip	238.75	438.48	796.45	1,273.61
Per Mile	159.17	146.16	132.74	127.36
Per Hour	337.07	334.28	334.18	334.13
Per Year	134,828.00	133,712.00	133,672.00	133,652.00

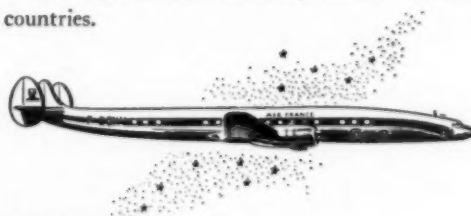
WHAT DO YOU KNOW ABOUT AVIATION...

Who Received The First Airmail Letter?



So familiar is this face we silhouetted it to add fun to the game. It was during an extended stay in France that this famous American became interested in the balloon experiments being conducted by French scientists...watching many of the earliest attempts at successful flights. When John Jefferies (an American) and Jean-Pierre Blanchard made the first flight across the English Channel, they delivered the first airmail letter into his hands. His name was Benjamin Franklin.

The early French interest in aviation developed over the years. A century and a half later French pilots inaugurated airmail service across the South Atlantic and to the Far East. This tradition has culminated in the world-wide service of Air France, which annually carries 715 million separate pieces of mail to the peoples of 73 countries.



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TRANSPORT TRENDS

Washington, D. C., June 4, 1956

CAB IS GETTING INVOLVED in serious over-lapping of major route cases that will become apparent by Fall. Many cases involve identical or closely-similar new route proposals. One major reason for sudden buildup is the rash of proposals by individual cities for investigations of airline service at such cities.

Among cities providing springboards for institution of major route cases are Baltimore, Ft. Worth, Dallas, Houston, St. Louis. Because of pressures cities can generate through Congress etc., Board handling of cases is more expeditious than if airlines tried to push isolated applications. Biggest case now shaping up as a result of city proposals is one involving service between California, Texas and Florida.

●
LOOK FOR A TUG-OF-WAR INSIDE CAB for voting support of two new Members—Chairman Durfee and Member Minetti. Last year's minority—Republicans Gurney and Denny—need one of the new Members for a majority. Only remaining member of last year's majority—Vice Chairman Adams, Democrat—needs both new members. Democrat Minetti, sworn in this month, had solid support of GOP Chairman Leonard Hall for the CAB post, whereas Republican Durfee may be on outs with Republicans for overriding GOP National Committee on an internal Board staff move.

●
NOT ALL LOCAL SERVICE LINES are convinced that the turboprop is the answer to their DC-3 replacement problem. Big question is economics, particularly during winter when carriers in midwest and east are forced into "pogo stick" type operations to avoid excessive traffic control delays. They want more answers on turboprop seat-mile operating costs at 3,000 and 4,000 ft. levels

●
DEMAND IS NOW SHAPING UP for increased jet fuel production. Over the next four years, consumption may rise 50% above present, American Petroleum Institute estimates. Two reasons: commercial jet orders, rising military needs.

Aviation gasoline sales won't slump, however. They're expected to stay at 1956 levels through 1965. Additional airline consumption generated by 350 piston transports still on order will more than offset decline as USAF and Navy shift to all-jet operations.

●
THE 23 DC-3s that Navy will lease to local service and territorial airlines are expected to be returned over to the operators later this month. Lease price isn't final yet. Figure of \$2,000 per month has been mentioned, with operators getting a credit for overhaul costs.

●
CAPITAL AIRLINES OFFICIALS have been talking with Vickers in London about buying more Viscounts. They're also discussing possibility of purchasing Britannias from Bristol. With new route awards, Capital needs equipment, and will buy—if satisfactory financial arrangements can be worked out.

TRANSPORT AVIATION

Is 'Fare Investigation' Quite Fair?

It all depends on the viewpoint; four different yardsticks are being used to measure earnings; new techniques needed, says ATA.

By WILLIAM V. HENZEY

CIVIL AERONAUTICS BOARD'S recently-instituted General Passenger Fare Investigation appears to have been misnamed. It might more aptly be called a General Airlines Earnings Investigation.

In fact, pinpoint accuracy would require a title descriptive of an investigation into the many methods employed to determine airline earnings. Depending upon the situation, CAB employs four different yardsticks in arriving at profits and return on investment.

The airline industry, which generally favors the operating ratio technique, also has not arrived at a unanimous method which might clear the air.

• The significance of this confusion is that by one yardstick airline earnings may be high and an enforced fare cut looked for, or by another, earnings may be inadequate and fares should be raised, either conclusion being possible on the one set of revenues and expenses.

The question confronting the airline industry therefore is whether the advantages of resolving the differences in determining earnings will be sufficient to outweigh the uncertainty in financial circles that can be expected to accompany an investigation labeled a "fare investigation."

The industry is heavily committed for new aircraft and facilities and can only be hurt by a weakening in investor's confidence. The public also would stand to gain little if, during the pendency of a "fare investigation," the downward trend in air fares of recent years is halted.

• The investigation ordered by CAB last month does not challenge any specific fare as being too high. Rather, the Board action appears to be a direct result of the House Antitrust Subcommittee's attack on what it considered to be "excessive earnings" in the airline industry.

Because passenger traffic accounts for the highest percentage of airline revenues, the avenue popularly felt to be open to reduction was the passenger fare structure. Hence, a General Passenger Fare Investigation.

But airline earnings cannot be measured without a comprehensive look at all sources of revenue. And since the level of domestic airline passenger fares is perhaps the least vulnerable to a finding of "over-pricing," it is not being overly-optimistic for the industry to look with confidence at a properly conducted investigation.

A Unique Business

• In fact, the airline business may emerge from the current attack as a

unique type of business in determining earnings. This point was presented forcefully to the House Subcommittee last month by Stanley Gewirtz, vice president of the Air Transport Association.

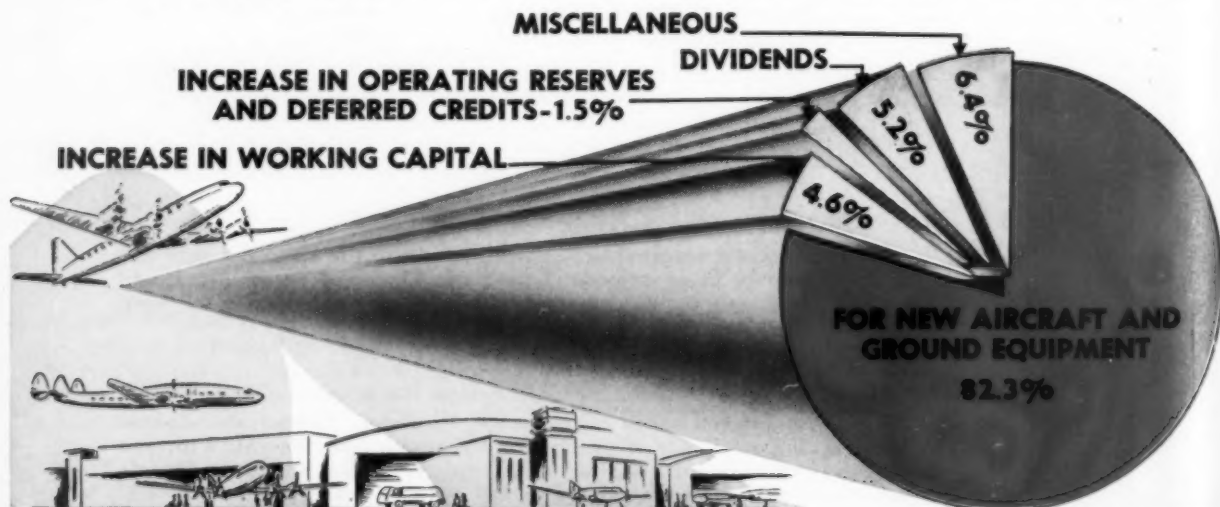
"Rate of return on investment," he said, "is a good solid, legal sanction as a test where the question is whether rates are confiscatory or compensatory in a constitutional sense." But rate of return on investment (the measure responsible for the new CAB investigation) "has little relationship in fact to air-transportation."

"The method of measuring profits," Gewirtz went on, "must depend upon the nature of the business. It is just as logical to measure the validity of profits by their relation to gross revenues. The gauge you use depends upon the age of the industry. It depends upon the investment in the business. It depends upon the stability of the enterprise."

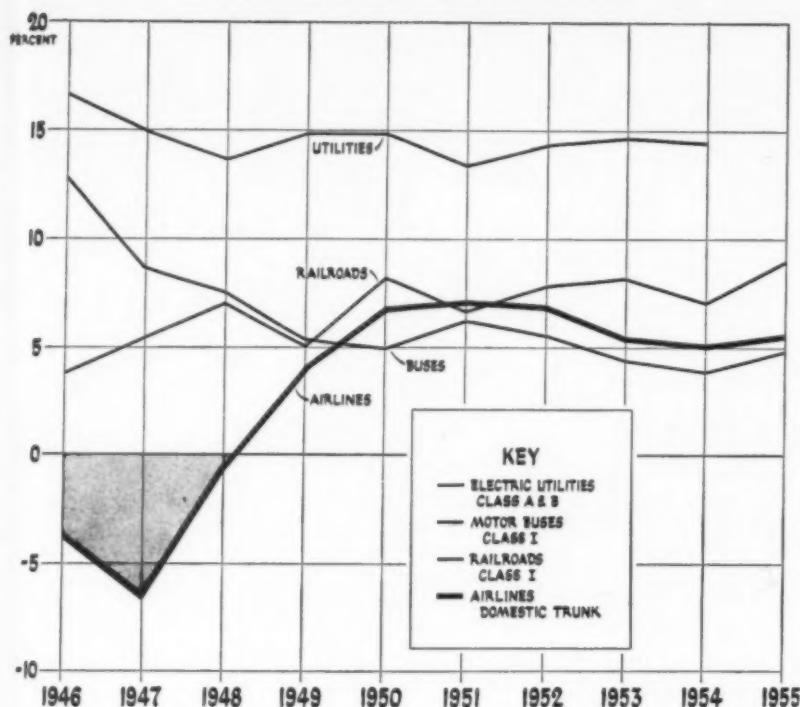
"It depends upon how fast you turn over your capital and how quickly your equipment becomes obsolete. And, in our business, it depends to a very great extent upon your load factor."

The ATA official went on to point out that most public utilities require a large amount of capital in relation to their gross business, and their revenues and expenses are both pretty stable. Thus, when permitted to fix rates which

Airline Industry Has Ploughed Back Earnings and Capital Into Improved Services to Public



Airlines' Net Income Low in Comparison to Railroads, Utilities (In Relation to Operating Revenues)



produce 6.8% return on investment, resulting profits represented a comfortable margin of safety.

• In the airline industry, gross business annually exceeds invested capital and a return based on such capital is minor in relation to the other utilities. Thus, the same percentage rate of return for the airlines does not mean profits as high as the other utilities.

Gewirtz said the ATA is suggesting that "we develop measuring sticks which are not deceptive. The hallowed return-on-investment doctrine . . . is deceptive when it is generally applied on a wholesale basis to an industry like air transportation.

But even the variations in the return-on-investment technique must be eliminated. For example, the CAB

order opening the fare investigation shows that the industry enjoyed returns ranging from 10.4% in 1954 to a high of 14.6% in 1951. Some weeks before, however, the agency submitted figures to the House Subcommittee, showing returns for those same years as 10.6% in 1954 and 14.9% in 1951. Despite the small percentage differences, over \$1 million is involved in each case.

• Still another CAB return figure is available for the year 1951. In an internal Board publication entitled "Airline Statistics Hand Book—U.S. Air Carriers," the return for domestic trunks in that year was 12.7%, or substantially under the 14.6% and 14.9%, as mentioned above.

In some cases, CAB includes in an investment base (on which to compute a return rate) non-operating property and equipment. In profits, it includes all funds from the sale of equipment. In fixing subsidies, however, only such property as is "used and useful" for the operations is included in the investment base.

The point in all this, to repeat, is that there are too many variations in computing airline profits. Rep. Emanuel Celler expressed the hope that the CAB investigation will "knit all these together."

• Also significant in the peculiar role the airline industry occupies in the earnings picture is the fact that a vast percentage of monies available, i.e. from earnings, loans, equity, etc., must be ploughed back into the ever-changing equipment market. For the past 10 years, the airlines have reinvested 82% of all such monies, or well over one billion dollars.

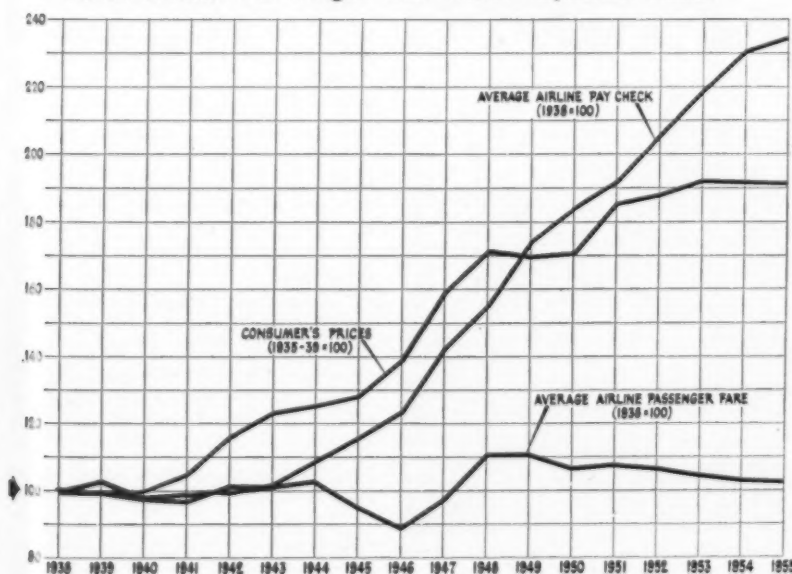
Thus, in contrast with 1953 when the controversial fare investigation of that period actually dealt with specific charges to the public, the 1956 version appears on a much more educated scale and may for the first time establish a uniform method of determining profits—or losses.

On June 12, CAB will hear industry arguments regarding the scope of the proceeding. Thereafter, there will be another Board order which will be a green light for the proceeding to get under way. ♦♦♦

Resort Buys 1049Hs

Resort Airlines has bought two 1049H Super Constellations from Lockheed Aircraft at cost of \$5 million, including spares. Interiors will be convertible from cargo to passenger configuration. Planes will be used in contract cargo operations for the Defense Dept. and in Resort's "aircruise" business.

Fares Decline As Wages and Other Expenses Climb



Boeing Gives Preview of Plush Jet Interior

Passenger service and lighting feature \$500,000 mockup, to be used as proving ground for cabin design of future.

Boeing Airplane Co., with close to \$500 million in jet transport orders already under its belt, is giving airline buyers a new "feel" for what its 707 cabin interior might look like come 1959.

The Seattle firm has teamed up with Walter Dorwin Teague Associates, New York industrial designers, to produce a \$500,000 full-scale mock-up of the jet's passenger cabin.

The 707 interior mock-up, Boeing says, is the first to be completed in the U.S. and is equipped to a detail never before approached in a new plane mock-up. This latter claim undoubtedly is one that will go uncontested by any aircraft producer.

For tucked away on the eighth floor of a warehouse at 601 West 26th St. in New York, Boeing and Teague have put together a cabin layout complete even to the simulated noise of engines. Seats, cabin furnishings and lavatories are all the real thing. It is air conditioned, all lights operate, and the galleys are actual hardware ready for installation in an airplane.

• At first glance one might get the impression that this is no more than one would expect to find in a new airplane coming out of the factory today. Lockheed with its Dreyfus designs and the efforts of General Motors' Harley Earl in Eastern Air Lines' DC-7Bs have brought transport interior decor a long way from the conservative furnishings of the late 1940s.

But once the 707 mock-up is examined in detail, it becomes quite obvious that Boeing and Teague have come up with a layout as novel to airline transports as the jets that will power them.

For example, the entire cabin is without curtains. Instead, each of the many "small" windows proposed by Boeing for its jet has two rigid plastic blinds. If the passenger wants to eliminate sun glare, a smoke-tinted blind can be raised simply by finger-tip action. If he wants to shut out light altogether, an opaque blind can be slid down just as easily.

• Most impressive innovation is a passenger service unit, shaped like an inverted armrest, that is suspended from the hatrack above each row of seats. Packaged in this unit are a "No Smoking-Fasten Seat Belt" sign, stewardess call button, air outlets and reading lights. It also contains a speaker for



Camera exaggerates length of cabin in Boeing mock-up. Color of seat upholstery is varied in blocks to give appearance of shorter cabin. Note passenger service pods suspended from hatrack over each seat row.



Life rafts on Boeing jet will be stowed in hatches over main exits.



Each galley service and main door is fitted with an inflatable escape slide.

the aircraft's public address or recorded music system.

Still in the discussion stage is a plan to fit this unit with emergency oxygen equipment. Proposal is that, in event of explosive decompression, oxygen masks for each of the passengers would be ejected from a door on the forward side of the unit and dropped into the lap of the passenger.

Another impressive feature of the 707 interior mockup is its lighting. Aside from the conventional reading lights, the cabin ceiling is fitted with five oval-shaped domes which measure up to three feet wide and more than four feet in length.

• But the novel feature of their proposed use in the 707 is the way they can be varied in intensity from a normal amber color, then to sunset-red and finally to a deep blue for night flying. Stars are reproduced in the fixtures to give the passenger the feeling of looking directly into the sky through the cabin ceiling.

Walls and ceilings are covered with prefabricated panels using Boltaron plastic washable surfaces laminated on metal. Wall panels measure 20 inches wide, can be removed individually for maintenance or aircraft structural inspection.

• Boeing cautions that the mock-up doesn't represent the layout for any airline's interior, but is the "short-body" version of the 707. It seats 98 passengers, with provision for ten others in two

*"Speak softly
and carry a big stick"*

Theodore Roosevelt

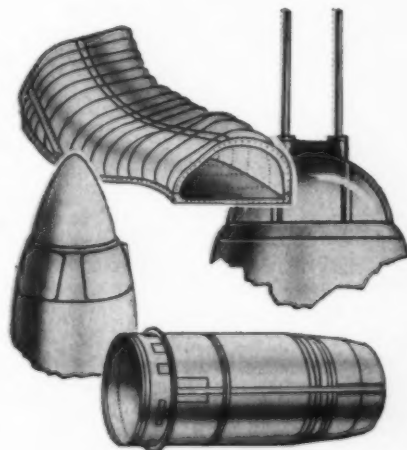


GOVERNMENT PRODUCTS DIVISION

In December 1907, the "Great White Fleet," consisting of sixteen fully armed battleships, set sail from Hampton Roads, Virginia. Its purpose: to quell the tension that was mounting in the Far East by creating visible evidence of United States power. This was Teddy Roosevelt's "*big stick*."

Today, we are not without the need for a *big stick* of our own; and Rheem, as a major producer of quality government products, is proud of its contribution to the filling of this vital need. You can rely on Rheem for quality, for low per-unit cost, and for on-time delivery. The record speaks for itself... and eloquently.

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Box-Score of Boeing 707 Buyers

First complete listing of airline buyers of 707 jets and approximate costs were disclosed by Boeing with the unveiling of its new interior mock-up. Contracts involve 88 aircraft valued at \$470.5 million. Individual orders by carriers are as follows:

Airline	Date	No.	Type	Approx. Cost. (Millions)
Pan American	10/13/55	20	707-120	\$109
American	11/ 9/55	30	707-120	135
Braniff	12/ 1/55	5	707-220	30*
Continental	12/12/55	4	707-120	21.3*
Air France	12/28/55	10	707-320	71.5**
Sabena	12/28/55	3	707-320	15.45
Sabena	1/26/56	1	707-320	5.25
Trans World	2/ 7/56	8	707-120	36
Pan American	2/23/56	3	***	26
Lufthansa	4/24/56	4	707-320	21
Total		88		\$470.5

* Includes spares

** Includes spares and training

*** PAA order changed to six 120s and seventeen 320s at \$135 million.

five-seat lounges fore and aft.

In all, the Teague firm has put 16,000 man-hours into the mock-up design and some 25,000 into construction. A total of 43 firms supplied parts and materials and 1,047 assemblies constitute its make-up.

Boeing plan, officials say, is to keep

the device on the east coast for at least another year so that it will be more readily available to airline officials as a "proving ground" for interior design. But, should Boeing so decide, its construction is such that it could be moved to Seattle to be on hand as the actual jets begin to take shape. ♦♦♦

C'est Bon! French Hostesses Add Zest to Flights Via Allegheny

By ERIC BRAMLEY

When Allegheny Airlines president Les Barnes left for Europe six weeks ago it was assumed that, like many another local service airline executive, he had gone to inspect the Fokker F-27 Friendship as a possible DC-3 replacement.

But Barnes foxed even his industry colleagues. He was headed for Paris. His purpose: to participate in the selection of 14 French girls to be used as hostesses on AAA's Martin airplanes.

The 14 girls will fly on the Martins for six months, after which they will go to work as hostesses on the international routes of Air France. They started with AAA June 1.

• That this can be a sales promotion idea that will pay big dividends is a view firmly held by Barnes, Dave Miller, AAA's vice president-sales, and other company officials. Their reasons:

• It will promote interline sales by calling attention of trunkline employees, particularly those in sales and reservations, to AAA's services.

• Favorable reaction of passengers will result in word-of-mouth advertising.

• By giving its service an international flavor, AAA believes its own employees will become more conscious of the value of international sales (7½%

commission to AAA on each sale).

• The girls will make radio and TV appearances and will also be used for other publicity purposes.

• From Air France's standpoint, the deal is advantageous. When the girls return to its routes they will have had extensive experience in taking care of American passengers. The Air France name will also become better known in the cities served by AAA.

When originally approached by AAA, Air France was enthusiastic about the proposal. It placed an ad in French newspapers, stating that it was hiring hostesses and that initially the job called for flying six months on Allegheny Airlines, a U.S. carrier (a sharp-eyed U.S. correspondent read the ad and wrote a story, which fortunately for AAA did not receive much play in the U.S. and thus did not take the edge off the publicity break).

Plenty of Applicants

There were 162 applicants, who were screened down to 37 and then to 22. There was little choice between the 22, so AF hired eight for its own routes, and employed the other 14 for AAA.

All the girls are on AF's payroll. All speak excellent English (none of them has ever been to the U.S. before). During their duty with AAA, the local

service line pays such costs as overnight expenses when away from base. The girls are based in Washington, Pittsburgh and New York.

• AAA informed its union representatives that none of the present male flight agents will be released, furloughed, or lose any seniority. The company is expanding its services, and the agents will be used on DC-3 schedules.

AAA, however, is considering adopting a new policy: even after the French girls' services are terminated, it may continue to use hostesses rather than male flight agents on all Martin flights.

As a matter of fact, if the deal is outstandingly successful, the company may consider taking some more AF girls for another six months.

The hostesses' uniforms, incidentally, were created by a well-known French designer. They're more "suits" than uniforms. "Remove the insignia and you could wear them anywhere," says an AAA official.

• Air France's method of selecting the hostesses drew praise from Barnes. "They were thorough," he states. Each girl was interviewed by a panel. Each panel member graded each applicant individually. Many were eliminated in this manner.

Baptism of Fire

When the number had been reduced to 37, the scene shifted to Paris' Orly Field, where Air France has a mockup of a Constellation cabin. Each girl—with no training—was put aboard and told that her job was to greet the passengers, show them to their seats, take their hats and coats, etc.

Several "passengers" then entered—and each had been previously instructed to cause an "incident." The first one bumped his head on the overhead rack when getting into his seat. Did the hostess ignore him? Was she so solicitous that she held up the other passengers too long? Or did she spend just the right amount of time with him?

The second passenger had been imbibing a little too freely. The third had had his baggage mishandled and was taking it out on the hostess. And so forth.

"A little rugged, perhaps, for a girl with no training—but an excellent test of reactions under unusual circumstances," says Barnes. This method reduced the number from 37 to the final 22.

Playing a major role in selecting and training the hostesses was Robert C. Schumm, AAA's director of stations. Initial training courses were conducted in Paris, and further instruction was given by AAA at its Washington, D. C., headquarters. And AAA thinks that it has an idea that's going to click.

World Airlines Head for \$4-Billion Mark in '57

Losses of 200 smaller foreign carriers almost overpower tremendous gains in revenues by North American carriers.

By ANTHONY VANDYK

Thanks to profitable operations of U.S. and Canadian airlines, the financial situation of the world's air carriers as a whole is rosy. Nonetheless, most of the smaller airlines outside the North American continent are operating at a loss, and while their operating revenues are steadily rising, it will be many years before the majority of them move into the black.

A status report on world commercial aviation prepared by the International Civil Aviation Organization's Council estimates operating revenues of scheduled airlines, which were only \$1 billion in 1947, should top the \$4-billion mark by 1957. Last year these revenues amounted to about \$3.026 billion. These figures include airline earnings from scheduled operations, charters, special flights and incidentals but excludes "all apparent elements of government subsidy."

Operating expenses for the year are estimated at \$2.993 billion. The revenue and expenses increased from 1954 to 1955 in almost similar proportions—18.2% and 18.4%, respectively.

• **Total world operating profit** for 1955 was \$33 million, indicating a lower rate of earnings than the \$32 million figure for 1954, when the increase in traffic is taken into account. But it compares favorably with an apparent operating loss of about \$3 million for 1953. ICAO warns, however, that these figures should not be regarded as having any significance for any given airline.

Net operating profit of the U.S. and Canadian airlines is estimated at about \$136 million for 1955. The ten largest airlines outside the North American continent (six in Europe, three in South America and one in Australia) showed an aggregate operating profit of \$8.75 million in 1954 and probably did about as well in 1955.

All this would indicate an aggregate operating loss of about \$112 million for some 200 smaller scheduled airlines scattered throughout the world.

• **In 1955 passenger traffic** accounted for 78.3% of the revenue for the world's airlines against 77.7% in 1954 and 74.3% in 1951. The percentage of revenue from cargo—11.2% in 1955—has varied no more than 1% over the past five years. Cargo tonnage carried in 1955 was far greater than that in previous years. But this is not re-

World Financial Statistics for Airlines, 1951-55

REVENUES (U.S. \$ million) ¹	1951	1952	1953	1954	1955 (est.)
Passengers	1,340	1,552	1,772	1,990	2,368
Cargo	215	237	258	280	338
Mail	156	169	175	183	210
Charter	58	46	45	51	59
Incidentals	35	46	64	56	51
Total operating revenues	1,804	2,050	2,314	2,560	3,026 (est.)
EXPENSES (U.S. \$ million)					
Flight operations	528	609	694	753	893
Maintenance & Overhaul	344	413	448	487	559
Flight equipment depreciation	138	161	201	226	273
Other	770	880	974	1,062	1,268
Total operating expenses	1,780	2,063	2,317	2,528	2,993 (est.)
Net operating revenue	+24	-13	-3	+32	+33
Operating ratio (Revenues as a percentage of expenses)	101.3	99.4	99.9	101.3	101.1

¹ Elimination of subsidy from mail revenue figures for 1951-1955 has resulted in a slight change in the relative importance of the various classes of traffic as sources of operating revenue for the world's scheduled airlines, as shown in the following table:

Percentage of Operating Revenues by Type of Traffic

	1951	1952	1953	1954	1955 (est.)
Passengers	74.3	75.7	76.6	77.7	78.3
Cargo	11.9	11.6	11.1	10.9	11.2
Mail	8.7	8.3	7.6	7.2	6.9
Charter	3.2	2.2	1.9	2.0	1.9
Incidentals	1.9	2.2	2.8	2.2	1.7
Total operating revenues	100	100	100	100	100

flected in a growth in the percentage of revenue from cargo because the average unit revenue from cargo (37.2c per ton-mile) is much lower than that for passengers (63.1c per ton-mile) and for mail (81.8c per ton-mile). Mail revenue has declined steadily in recent

years—from 8.7% in 1951 to 6.9% in 1955.

Taking all classes of traffic as a whole, the average unit revenue per ton-mile performed amounted to about 59.9c in 1955, as against 60c in 1954 and 60.6c in 1953. The average unit expense was 35.2c a fraction above the 1954 level. Among the main categories of expense, the largest increase was in flight equipment depreciation, amounting to \$273 million in 1955, more than 20% above the 1954 depreciation figure. Depreciation now represents 9.1% of total operating expenses, having risen from 7.8% in 1951.

• **Total airline traffic** throughout the world—in terms of ton-miles performed—continues to rise. Even if the growth continues at the rate experienced last year, it will have doubled by 1959, ICAO estimates. Even if only the average rate of increase for the last four or five years is maintained, doubling will only take until 1960. The world total in 1955 was 4.917 billion ton-miles against 4.155 billion ton-miles. The gain in passenger-miles was 18%; in cargo

Safety Record Since 1945 Shows Sharp Improvement

	Number of Fatal Accidents	Number of Passengers Killed	Fatality Rate per 100 million Passenger-mi.	No. of Fatal Accidents per 100 million aircraft mi.
1945	20	247	4.84	5.36
1946	32	376	3.91	5.47
1947	34	590	5.02	4.80
1948	38	543	4.18	4.81
1949	32	556	3.85	3.83
1950	27	551	3.25	3.03
1951	20	443	2.06	2.03
1952	21	386	1.56	1.95
1953	28	360	1.24	2.35
1954	28	450	1.38	2.20
1955	26	408	1.06	1.85

ton-miles, 19%; and in mail ton-miles, 16%.

Almost 70 million passengers—slightly more than the combined populations of the British Isles and Canada—flew on scheduled airlines throughout the world in 1955. While increases were general, the largest gain appears to have been on routes within Europe where the increase was some 27% above the 1954 level. The average length of all passenger journeys was 559 miles, a figure that has fluctuated less than 6% over the last ten years.

In 1955, for the first time since 1947, the percentage of increase in airline cargo traffic (19%) was greater than that of the preceding period—it had fallen sharply without a break from 128% in 1947 to 6% in 1954. Also, for the first time since 1950, the rate of increase in cargo traffic exceeded the figure for passengers (18%).

There is not, however, as yet any sign of a reversion to the very rapid rate of increase in cargo ton-miles which marked the years 1946 to 1950, when the annual gains ranged from 128% to 33% and the total averaged 59%.

* In terms of ton-miles, the 1955 increase over 1954 was 145 million, which exceeded the total increase in the previous three years and brought the world figure to the new high level of 907 million ton-miles. These figures relate only to cargo carried on scheduled

Passenger Traffic Grows Faster Than Population

THOUSANDS

	United States	
	Population	Air Passengers
1951	154,360	22,562
1955	165,248	38,900
	(+ 10,888; + 7.1%)	(+ 16,338; + 72.4%)
	Canada	
	Population	Air Passengers
1951	14,009	1,091
1955	15,601	1,727
	(+ 1,592; + 11.4%)	(+ 636; + 58.3%)
	Australia	
	Population	Air Passengers
1951	8,422	1,824
1955	8,987	2,040
	(+ 565; + 6.7%)	(+ 216; + 11.8%)

This ICAO-compiled comparison of the growth of population with the increase in domestic airline passengers shows that the rate of increase in airline passengers has been more than ten times the rate of population increase in the U.S.; more than five times the rate of increase for Canada; and almost twice for Australia. In the U.S. the increase in the number of passengers exceeded the increase in the total population.

flights of the scheduled airlines. They omit the large volume of freight carried by non-scheduled operators.

With an increase of 35 million ton-miles to 257 million, mail showed a slightly lower rate of increase (16%)

than the other two main categories of traffic. ICAO says that much of this increase is believed attributable to the increased prevalence in the U.S. of the practice of sending ordinary mail by air on domestic services where delivery will be expedited by so doing. This has been done in Europe for several years.

Another reason for the increase is the diversion of military mail in general from military to civil transport, ICAO says.

Following a gradual decline in three successive years, load factors for the world's scheduled air services (international and domestic combined) rose slightly in 1955, averaging 59.5% against 59.1% in 1954. The 1955 load factor is still below the high of 62.5% recorded in 1951. For the sixth successive year the load factor for international services (61.5%) exceeded the average for domestic services (58.4%).

Safety Record Improves

* The tremendous improvement in the airlines' safety record is pointed up by ICAO. The fatality rate per passenger-mile has been reduced to little more than one-fifth of what it was in 1945. For the third successive year, it has stayed at less than one and a quarter fatalities per 100 million passenger-miles. The reduction in the accident rate, in terms of aircraft-miles flown, is now about a third of what it was in the immediate post-war period.

If the safety record is extended to compare with the post-war period (1944-1955) with the war period (1940-1944) and the pre-war period (1925-1939), it becomes apparent that the average fatality rate per 100 million passenger-kilometers flown has dropped from 12 in the pre-war period to 3 in the war period, to 2.4 in the first five years after the war and to 0.9 for the next five years.

The improvement has been so great that the actual number of accidents has decreased, notwithstanding the tremendous increase in the amount of flying done. For 1946-1950, the average number of fatal accidents per year was 32.6 and the average number of fatalities, 523, whereas for 1951-1955 the figures dropped to 24.6 and 409, respectively.

These facts and figures on world civil aviation will be discussed at ICAO's tenth Assembly which opens in Caracas, Venezuela, on June 19. They were prepared by ICAO's Council. The Assembly will be attended by the heads of the civil aviation departments of ICAO's member nations and by observers from various aviation organizations. It will review ICAO's first ten years of activity and may recommend changes in the body's structure and policy to make it more efficient and useful in the years ahead. ♦ ♦ ♦

How Civil Aviation Has Grown Since 1929

Year	Miles Flown	Passenger Miles	Passenger Ton-Miles	Cargo Ton-Miles	Mail Ton-Miles	Average Number of Passengers per aircraft
IN MILLIONS						
1929	57	132	14	—	—	2.3
1930	73	180	17	—	—	2.4
1931	85	206	21	—	—	2.4
1932	86	251	24	—	—	2.9
1933	96	337	34	—	—	3.5
1934	101	405	41	—	—	4.0
1935	125	606	62	—	—	4.9
1936	144	795	79	—	—	5.5
1937	165	880	86	—	—	5.3
1938	186	1,048	103	—	—	5.6
1939	185	1,262	127	—	—	6.8
1940	186	1,572	158	—	—	8.5
1941	211	2,037	202	—	—	9.6
1942	196	2,183	216	—	—	11.1
1943	198	2,589	257	—	—	13.1
1944	257	3,412	339	—	—	13.3
1945	373	5,100	507	77	90	13.7
1946	584	9,630	955	82	67	16.5
1947	708	11,740	1,164	187	88	16.6
1948	789	12,990	1,288	286	114	16.5
1949	836	14,480	1,435	390	128	17.3
1950	892	16,960	1,681	518	143	19.0
1951	988	21,560	2,106	630	160	21.8
1952	1,078	24,860	2,428	681	175	23.1
1953	1,190	28,890	2,815	719	189	24.3
1954	1,268	32,620	3,171	762	222	25.7
1955	1,407	38,530	3,753	907	257	27.4

This ICAO-prepared table shows the development of civil aviation from 1929 to 1955. The data relates to revenue traffic carried on scheduled domestic and international services in all countries of the world except to Soviet Union and Red China.

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FORMERLY PIASECKI HELICOPTER CORPORATION

U.S. Leads Russia in Commercial Air Transport, Red Papers Admit

The United States still leads Russia in its rate of commercial air transport development besides being far ahead in actual volume of passengers, cargo and mail carried.

New figures released by Russia's Civil Aviation Administration show that during the Fifth Five-Year Plan (1951-1955), when many phases of Soviet industry reported larger percentage gains than comparable branches of American industry, the USSR's airline monopoly—Aeroflot—had a smaller overall ton-mile increase than U.S. air carriers. Despite the imminent introduction of Tu-104 jet transports into regular commercial service, no sharp jump in Russian commercial air traffic is contemplated during 1956.

Grazhdanskaya Aviatsiya, the Russian CAA's official organ, discloses that Aeroflot flew 106% more ton-kilometers in 1955 than in 1950 on its entire domestic and international system. During the same period, total ton-miles flown by all U.S. carriers rose more than 119%. With international business rising almost four times as fast as domestic, Aeroflot's overall 1955 traffic was up 8.3% over 1954. The U.S. domestic-

international-territorial gain last year was nearly 18%. Even with a few Tu-104s in scheduled service, Aeroflot says it will fly only 12% more ton-kilometers in 1956 than in 1955.

• Besides having a civil air fleet with much smaller lift capacity than U.S. airlines, Russia admits it is plagued by low load factors and poor equipment utilization on many routes. *Grazhdanskaya Aviatsiya* is especially critical of inefficiency at some of Aeroflot's main overhaul and repair bases.

Schedules Disrupted

"Inadequate overhaul, repair and servicing is particularly prevalent in the Western Siberian and Far Eastern divisions. This has led to a disruption of the schedules for aircraft repairs and the idling of a substantial amount of equipment and of crews. Sometimes entire subdivisions are forced to operate without a reserve of serviceable planes. The effects are widespread.

"Unrhythmic work at the Novosibirsk repair and overhaul base, for example, is reflected in the operations of not only the Western Siberian Territorial Administration but also of the entire main trans-Siberian air route between Moscow and Khabarovsk. At the Khabarovsk and Novosibirsk repair and overhaul bases, the average period required for technical servicing of a plane in 1955 was three times as long as at the Moscow repair and overhaul base. As a result, Aeroflot's Far Eastern Administration, notwithstanding its high load factor, failed to fulfill its ton-kilometer quotas in 1954 and 1955.

"Defects in individual planes are sometimes corrected very slowly. For example, several IL-12s spent six to seven months each in the repair shop. With better planning of overhaul and repair work, such idleness of equipment could be sharply reduced."

Grazhdanskaya Aviatsiya said that

one of the most serious shortcomings in the work of some Aeroflot subdivisions last year was a decrease in flight regularity. "Part of the trouble was due to poor weather conditions during the first quarter of 1955. On the other hand there were many cases in which airports were closed down inexcusably."

The Russian CAA also noted that Aeroflot's plane utilization still lags behind the average for capitalist airlines, but the situation is improving through introduction of crew changes on more routes and a better arrangement of schedules. The most efficient subdivisions have achieved a utilization of 1450 to 1600 hours annually per "registered" IL-12 and 2000 to 2240 hours annually per "operational" IL-12. In the summer a maximum utilization of 330 to 350 hours per month has been achieved in a few subdivisions.

Turning to traffic development, *Grazhdanskaya Aviatsiya* said that the greatest business gains in 1955 were reported by the Far Northern, Siberian and Far Eastern sectors, which had gains of 30% last year as compared with 8.3% for the system as a whole. Between 1950 and 1955, traffic in Aeroflot's Far Eastern Territorial Administration soared 223 per cent; and Magadan, strategic port on the Sea of Okhotsk opposite Kamchatka, has become Russia's fifth-busiest airport from the passenger standpoint. Even so, demand for air transportation in Russia's Far East "remains far from satisfied."

Currently about 60% of Aeroflot's total traffic is along the carrier's main domestic trunk routes and a few shorter links to vacation resorts in the Caucasus and Black Sea area. The Moscow-Khabarovsk run alone accounted for 26% of all ton kilometers flown last year.

Regional links in Siberia, the Far North, the Far East and Central Asia provided 21% of Aeroflot's 1955 traffic. International operations and the remaining regional routes generated 19%.

Gen. White Urges Raises For AF Technicians

A new pay raise, one big enough to persuade jet engine mechanics, hydraulic experts and electronics specialists to stay in the Air Force, is a necessity, says AF vice chief of staff Gen. Thomas White.

"What we need is a pay raise that, added to other service benefits, will more nearly equal the compensation of equivalent civilian positions," he contends.

Gen. White adds that present AF training costs are tremendous, but that the cost of proposed remedies would be far smaller than the amounts now paid in turnover costs.

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SUMMARY OF U.S. DOMESTIC AIRLINE TRAFFIC FOR MARCH, 1956

(Compiled by American Aviation Publications from official CAB data.)

AIRLINES	REVENUE PASSENGERS	REVENUE PASSENGER MILES	AVAILABLE SEAT MILES	PASSENGER LOAD FACTOR	MAIL TON-MAILES**	EXPRESS TON-MAILES	FREIGHT TON-MAILES	TOTAL TON-MAILES	REV. TRAFFIC	AVAILABLE TON-MAILES FLOWN	% AVAILABLE TON-MAILES USED	REVENUE PLANE-MILES	SCHEDULED MILES	% SCHEDULED MILES COMPLETED
American*	590,752	355,514,000	525,674,000	67.63	1,770,069	935,920	5,365,583	42,936,573	71,255,253	60.26	10,114,185	10,640,067	94.64	
Braniff	154,177	60,329,000	97,496,000	61.88	214,881	122,395	346,072	6,460,264	11,814,900	54.68	2,463,336	2,439,793	99.38	
Capital*	215,186	67,995,000	111,450,000	61.01	258,377	167,547	307,366	7,232,544	15,751,746	45.92	2,636,167	2,810,692	93.07	
Caribair	18,418	1,364,000	2,293,000	59.49	1,294	...	5,112	130,862	226,683	57.73	88,128	82,574	99.22	
Colonial	31,298	7,950,000	13,611,000	58.41	15,268	6,011	29,684	810,478	1,354,751	59.82	343,178	350,573	91.69	
Continental*	58,589	20,933,000	38,311,000	54.64	71,962	28,165	110,157	2,218,539	4,732,400	46.88	1,164,494	1,167,873	99.30	
Delta*	207,784	103,617,000	150,360,000	68.91	327,105	238,612	601,817	11,149,542	17,834,558	62.52	2,881,954	2,893,211	98.66	
Eastern*	660,395	381,396,000	546,598,000	69.78	993,915	432,982	1,187,180	42,289,332	76,004,347	55.64	8,727,745	8,913,355	96.97	
Hawaiian	28,775	4,012,000	7,082,000	56.65	4,862	...	124,992	487,755	943,567	51.69	231,546	210,352	95.12	
National*	152,218	116,438,000	150,843,000	77.19	358,231	77,777	522,601	12,881,010	16,924,395	76.11	2,342,278	2,437,160	92.47	
Northeast	32,969	6,623,000	11,649,000	56.85	9,389	11,915	21,390	658,076	1,164,916	56.49	385,335	484,971	75.28	
Northwest*	101,272	61,391,000	106,725,000	57.52	392,969	222,828	571,244	7,326,833	14,180,052	51.67	1,741,491	1,810,801	95.59	
Trans-Pac.	13,191	1,666,000	3,483,000	47.83	804	...	6,916	137,858	276,244	49.90	124,392	116,436	96.39	
TWA	321,590	232,369,000	390,489,000	59.51	1,075,152	680,020	1,982,835	25,988,279	46,982,532	55.31	6,729,417	6,994,236	95.64	
United*	495,421	323,352,000	507,873,000	63.67	2,540,084	1,012,538	3,738,954	38,363,640	66,454,070	57.73	9,329,971	9,430,354	97.23	
Western*	18,893	9,043,000	14,675,000	61.62	53,003,000	15,399	30,120	961,602	1,721,457	55.86	317,245	1,476,202	20.78	
TOTALS	3,100,928	1,753,992,000	2,678,612,000	65.48	61,057,799	3,952,109	14,952,021	200,033,187	347,621,871	57.54	49,632,208	52,258,650	93.76	
* Mail ton-mile figure includes non-priority mail carried by air as follows: American, 223,174; Capital, 51,769; Continental, 4,658; Delta, 31,133; Eastern, 229,354; National, 179,794; Northwest, 28,054; TWA, 150,383; United, 342,669; Western, 18,818.														
** Mail ton-mile figures include air parcel post.														
NOTE: Above figures include both scheduled and non-scheduled operations.														

SUMMARY OF U.S. INTERNATIONAL AIRLINE TRAFFIC FOR MARCH, 1956

(Compiled by American Aviation Publications from official CAB data.)

AIRLINES	REVENUE PASSENGERS	REVENUE PASSENGER MILES	AVAILABLE SEAT MILES	PASSENGER LOAD FACTOR	U. S. MAIL TON-MAILES*	FOREIGN MAIL TON-MAILES	EXPRESS TON-MAILES	FREIGHT TON-MAILES	TOTAL TON-MAILES	REV. TRAFFIC	AVAILABLE TON-MAILES FLOWN	% AVAILABLE TON-MAILES USED	REVENUE PLANE-MILES	SCHEDULED MILES	% SCHEDULED MILES COMPLETED
American	12,164	9,114,000	11,449,000	79.61	12,716	7,247	554	254,573	1,235,048	1,550,696	79.64	190,708	177,506	100.00	
Braniff	2,616	5,786,000	11,890,000	48.66	29,688	11,203	...	102,859	785,560	1,467,012	53.55	240,355	240,516	99.58	
Colonial	1,969	1,525,000	3,203,000	47.61	233	...	...	4,055	170,910	328,014	52.10	53,597	49,861	86.80
Delta	4,968	5,067,000	9,013,000	56.21	8,513	587	...	69,173	595,908	1,259,993	47.29	154,765	155,661	97.66	
Eastern	16,198	22,433,000	34,903,000	64.27	68,000	...	...	65,245	2,572,287	4,474,303	57.49	397,189	428,827	92.62
National	11,526	7,281,000	9,892,000	73.60	9,666	24	3,993	21,831	790,966	1,004,211	78.76	137,543	144,646	94.44	
Northwest	7,668	16,949,000	30,046,000	56.41	1,029,050	35,884	18,952	766,621	3,673,885	5,291,651	69.43	704,375	683,534	97.50	
Panagra	12,599	15,497,000	24,479,000	63.31	54,651	34,547	...	380,189	2,087,456	3,319,942	62.88	465,331	445,438	99.70	
Pan American															
Latin Amer.	102,426	83,395,000	131,058,000	63.63	350,680	70,818	...	3,275,665	11,933,847	19,091,645	62.51	2,592,856	2,492,968	95.32	
Atlantic	71,835	83,466,000	131,704,000	63.37	1,061,732	227,411	...	1,952,015	11,839,924	18,687,789	63.36	2,606,398	2,444,741	97.83	
Pacific	23,093	66,843,000	90,604,000	73.77	1,146,480	163,455	...	1,462,070	9,733,694	13,668,469	71.21	1,685,923	1,553,917	99.17	
Alaska	5,319	7,206,000	10,699,000	67.35	31,052	...	...	262,119	1,064,843	1,986,274	53.61	240,143	201,206	98.42
TWA	19,270	49,584,000	82,903,000	59.81	855,193	165,995	...	864,143	7,003,305	10,570,932	66.25	1,641,690	1,714,941	90.84	
United	6,628	16,444,000	26,357,000	62.39	124,796	...	...	55,149	1,882,994	3,173,046	59.34	420,962	438,868	90.93
TOTALS	298,479	390,590,000	608,200,000	64.22	4,821,370	717,171	23,499	9,535,707	55,370,627	85,873,977	64.48	11,612,532	11,172,630	95.95	
* U. S. mail ton-mile figures include air parcel post.															
NOTE: 1. Above figures include both scheduled and non-scheduled operations. 2. Data in above tabulations were compiled by American Aviation Publications from reports filed by the airlines with the Civil Aeronautics Board. Figures for American Airlines include that carrier's service to Mexico but not to Canada; for Braniff to South America; Delta to South America; Colonial to Bermuda; Eastern to Puerto Rico; National to Havana; Northwest to Orient and Honolulu; and United to Honolulu. Operations of U. S. carriers into Canada are included in domestic reports to CAB, in accordance with CAB filing procedures.															

TWA is using an excellent method of impressing employees with the fact that the little things cost money. In its current house organ is printed a picture of a ticket envelope, with a price tag of \$3,450 attached. This is the monthly bill for envelopes used on the TWA system. The company points out that it would "have to fly one passenger around the world two and one-half times to pay for that one item. Think of that next time before you toss a perfectly good envelope into the wastebasket."

Friend of ours remarks that there's no getting around the fact that aisles on coach airplanes are narrow. Says he saw a stewardess catch her skirt on a seat while hurrying along the aisle and almost rip out the hem. "Darned near lost the whole skirt," he notes. He thinks the airlines should allow the gals to wear slacks on coach flights. Vice presidents-sales please note.

Recently we commented that airlines' telephone service left much to be desired. After a recent trip, this remark goes double. In one city we held on to the phone for six minutes waiting for reservations to get "unbusy." And a friend of ours clocked his waiting time at over 10 minutes. The telephone is probably the most important gadget in the airline business, and if the carriers can't get around to answering it they might as well fold up shop.

Word always gets around this time of year that transatlantic airlines are practically sold out for the summer season. Not necessarily so, says Sabena Belgian World Airlines, what with cancellations, duplicate reservations, etc. And to keep travel agents fully informed, it issues periodically a "space availability" calendar. This is an easy-to-use single sheet showing calendars for June, July and August. Dates on which flights are sold out are printed in red, and an agent can tell at a glance what he can or cannot sell. Should be a good sales promoter.

Interesting to note how the New York Central is advertising its new Aerotrain in Chicago papers. There seems to be quite a similarity to airline advertising. As a matter of fact, the word "air" is mentioned several times (you'll "ride on air" because of a new "air suspension system") and the description "non-stop" is used. Looks like the rails are attempting to recapture some lost business.

Cleveland's New Flight Information Board



Electronic flight information board in new terminal building at Cleveland's Hopkins Airport uses 14,200 bulbs to report arrival and departure of some 250 flights daily. Board was built at a cost of \$96,000 by Spencer Displays, New York. Standing in front of the counter are Gordon Logan (left), United Air Lines' Cleveland sales manager, and Homer Tresise, UAL passenger service chief.

Sales, Traffic, Promotion

A survey conducted at New York International and LaGuardia airports for Muzak Corp. asked travelers to rate extra flight services in order of preference. The results: 26.2% said their first choice was special dishes, such as filet mignon; 25.1% specified soft music; 19.8% wanted cocktails in flight; 15% asked for facilities for babies and toys for children; 8.6% requested playing cards and games; 5.3% wanted cigarettes. Of all passengers interviewed, 82% recommended background music on planes . . .

Pan American World Airways is using a new approach in its U.S. newspaper advertising. More white space, more illustrations, shorter copy, more striking headlines. A new type-face will also be used . . . Almost ready is PAA's "New Horizons—U.S.A." which will cover the U.S. like "New Horizons" covers the world . . .

PAA is distributing a booklet, "There's Profit in the Air . . . With Clipper Cargo," telling shippers how to save money by using air cargo . . . Now on sale is a 35¢ pocket-size book, "Dining Out in Any Language," Written by Myra Waldo, PAA food consultant and published by Bantam, the book translates into English over 3,000 locally-named foods and drinks of France, Italy, Germany, Spain, Sweden, Portugal, Holland, Norway and Denmark . . .

American Airlines' catalog of "all-American vacations" is mailed with letters designed to catch the eye not only of the "boss" but also of his secretary. Special message for secretaries is signed by Terry Sorman, secretary to Charlie Speers, AA's senior v.p.-sales. Invites the gals to fill out the enclosed form for more vacation information, and includes another form for the bosses

. . . AA is out with an improved timetable. Contains a quick reference index, making it easy to find schedules. Also, you look at only one table for all the service between any two important cities. New type-face is more readable . . . AA has an A-1 direct-mail piece on its new Royal Coachman non-stop DC-7 transcontinental coach service . . .

Stocking mending kits that look like packages of book matches are being distributed by Trans-Canada to employees of other airlines . . . Central Airlines' new giveaways include a novel wallet for VIPs, special accounts, etc., and a ruler that comes in handy when using Official Airline Guide . . .

TWA has installed a Presto Model APB-12 tape reproducer in one of its Super-G Connies for service test and evaluation of in-flight music . . . Seal-right Co., producer of milk bottle caps, has tied in with TWA to sponsor a national jingle contest. Prize will be an all-expense trip to Disneyland via TWA for the winning child, under 16, and one adult. Tie-in was arranged by Jim Wulpi, Binghamton sales manager . . .

Braniff Airways has opened its second New York City ticket office in the Hotel Statler . . . Congratulations to Frontier Airlines on its brochure, "Miles Become Minutes—The 10-Year Story of Frontier Airlines." Excellent treatment of company's history and accomplishments . . . FAL has also issued a booklet, "A Career with Frontier Airlines," used as an aid in hiring new employees . . .

"Stop Over with Swissair" is a new folder published by the Swiss airline to help travel agents plan stopover itineraries for their clients. Contains 18 loose-leaf pages covering stopovers in Europe and Middle East. About 90 suggested routings are available . . .

Shortage of Scientists Hits NACA; More Than 600 Are Needed Now

Aviation's engineering manpower shortage, although widespread throughout industry, is by no means confined there. Its effects are becoming even more acute in the nation's top aeronautical research agency, the National Advisory Committee for Aeronautics.

Right now NACA sorely needs more than 600 aeronautical research scientists. Within the next 12 months this figure will grow by 35% to exceed 800. And with the demanding pace of research to retain U.S. airpower supremacy over the Soviets continually on the increase, there is no leveling off point in sight, officials say.

NACA's manpower shortage prevails throughout its five major facilities and runs almost proportionate to their present staffing. These include Langley Aeronautical Laboratory, Va. which now employs 3,182; Lewis Flight Propulsion Laboratory, Cleveland with 2,692; Ames Aeronautical Laboratory, Calif. with 1,364 and NACA's High Speed Flight Station at Edwards AFB, Calif. employing 250.

• **Actually**, NACA's engineer scarcity stems from three sources: (1) increased research workload; (2) its inability to "compete" with industry salary levels in attracting graduate engineers; and (3) loss of key personnel in all grades to better paying jobs in industry.

But NACA's recruiting results should improve this year with the benefit of a recent authorization to jump salaries in the GS-5 and GS-7 classifications to the top of their brackets.

As a result, the agency can now offer a starting pay of \$4,480 for GS-5s (which usually represent applicants with bachelor degrees) and \$5,335 for GS-7s. These normally require master's degrees or equivalent experience.

In the past, GS-5 starting salary was \$3,670 and that for GS-7 was only \$4,525. Considering that NACA draws the bulk of its new talent among graduating engineers into these job classifications (almost 92% in one recent year) its recruiting effort should show better results.

NACA officials also look hopefully toward a solution to its other manpower problem, the loss of top-level scientists and engineers to industry. This situation has been on the increase steadily since 1955 to the point where the impact on NACA is being looked upon as disastrous and alarming.

• **A recent study** shows that of 203 personnel leaving NACA between

January 1, 1955 and March 31, 1956 146 went to private industry for jobs paying more money. Seven of these were in the GS-15 grade (\$11,000 to \$12,000) with an average of better than 10 years' experience.

NACA hope for relief from this situation extends in several directions. Legislation now being considered would increase from 10 to 60 the number of special positions it could set up outside the Civil Service Classification Act, paying between \$10,000 and \$15,000 a year.

Another amendment to this act, recently drafted by the Civil Service Commission, would authorize it to approve pay scales up to \$17,500 in such special cases where competitive non-Federal salaries are jeopardizing government programs.

NACA officials recently estimated that an overall adjustment of its salary structure for some 1,635 research scientists and engineers would cost about \$2 million annually. Its aim would be to increase all grades from GS-5 through the GS-15 and super grades to make them less a target for industry recruiting.

R&D Looks to Youth To Ease Shortage Of Scientists—Stever

Two most critical "items" in the U.S. research and development program are scientists and engineers.

Dr. H. Guyford Stever, chief scientist of the Air Force, says that while an aroused public "can help us improve our position" in R&D, "we can only get more good engineers and scientists by influencing young people with talent to enter this field."

• **Even then**, there can be no immediate relief from the shortage of these skills. He points out that interest should be instilled at the high school and early college level, and "many years must elapse before that group of interested students emerge as trained scientists and engineers."

And their influence in the professions takes still longer to be felt because they must get experience.

Dr. Stever lists the shortage of manpower as the first of four key factors important to performance of research and development. Second factor is facilities. "Here I refer to the specialized facilities of research and development." Third is funding, fourth is organization and management.

• **"An aroused and informed public can help us improve our position in every one of these four factors,"** he told the National Conference on Aeronautical Electronics.

"It is for those of us who understand the nature of research and development, who understand the long lead-time required to improve our manpower and facilities status, to use our talents not only to carry out our daily work, but also to inform the other segments of our society of the nature of our business.

"Only when they are so informed can they understand the need for long-term interest in our business, that is, if they want the results they are now demanding. All of the current suggestions to improve engineering and scientific education must be evaluated on the basis of their long-term influence. The same is true on facilities support.

"I think that it will be sometime before we succeed in educating our non-technical friends about these factors in our business, but we must devote some of our time to this task."

Facilities

Lockheed-Marietta has taken over Fairchild's engineering office in St. Augustine, Fla. Fairchild had planned to close the facility. Most of the 33 engineers involved have accepted Lockheed's offer of employment.

Douglas Aircraft has dedicated its Charlotte, N. C., division plant, which will be a missile-making facility. The plant formerly was the Charlotte Quartermaster Depot, and Douglas is spending \$16 million to convert it. Construction work is still going on.

North American Aviation has started moving about 1,450 employees from engineering groups and manufacturing sections of the Autonetics division into the \$3 million autonavigation building at Downey. Move will be completed by August.

American Research Corp. has broken ground for a new plant in Farmington, Conn. Company makes environmental test equipment.

Radioplane Co., wholly-owned subsidiary of Northrop Aircraft Inc., has opened its 25,000-sq. ft. facility at El Paso, Tex., and is already at work on modification, maintenance and repair of drone aircraft. Manufacture of parachutes for drones and missiles will start soon. Northrop reportedly plans to build a plant 10 miles from El Paso for manufacture of a new type of missile now in its "initial stages."

Hi-Shear Rivet Tool Co. has moved general offices to its new building at 2600 W. 247th St., Torrance, Calif. Customer service, purchasing and personnel remain at the factory at 8924 Bellanca Ave., Los Angeles.

Franklin C. Wolfe Co., makers of fluid seals and packings, has opened new manufacturing facilities and executive offices at 10567 Jefferson Blvd., Culver City, Calif.

North American Aviation is moving about 1,300 employees of five detail manufacturing departments of the Autonetics division from Downey into a newly-equipped 150,000-sq. ft. facility at Compton, Calif. About \$500,000 is being spent to improve the Compton plant.

AiResearch Manufacturing has installed a complete test facility at the Marine Corps' overhaul and repair depot, Cherry Point, N.C.

Hughes Aircraft Co. is transferring electronics manufacture and assembly from Culver City, Calif. to the El Segundo, Calif. plant recently purchased from American Motors for \$3 million. Over \$2 million will be spent improving the site. Move of 5,300 workers will be completed in June.

Simpson Electric Co., Chicago, established an avionics division to make aircraft indicating instruments.

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Developing major design layouts and assembly drawings; deciding location of aircraft or missile components and solving design stress problems.

Dynamics Engineers...

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For flight test instrumentation, data analysis, planning and coordinating airplane, missile, and helicopter test programs.

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Tool Designers...

Experienced on small and large machine shop and assembly jigs and fixtures. Openings at all levels—junior tool designers to group supervisors.

Plant Engineers...

Experienced in industrial building and utilities design, structural, mechanical and electrical.

Supervisor Facilities Engineering...

Must know design and planning of aircraft manufacturing buildings, layout of service departments, final assembly and hangar operations. Prefer BS IE with a minimum of six (6) years' aircraft experience in above type work.

Supervisors Methods Engineers...

One required for investigation of sheet metal fabrication, sub-assembly, and ramp manufacturing techniques. Another required for investigation of methods of all machining techniques, proving new machines and related tooling problems. Prefer BS ME or BS IE with minimum 4-6 years' related experience.

These positions of technical leadership are now available in our newly reorganized Industrial Engineering function. This is an ideal situation for experienced aircraft industrial engineers who are seeking additional responsibilities in an expanding manufacturing operation.

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W. R. Rhoads to Head Dawsonville Project,
To Be Biggest of Its Type in Nation

Lockheed Aircraft Corp., wasting no time in the development of nuclear aircraft testing facilities at Dawsonville, announced Tuesday that W. R. Rhoads will head up the Dawsonville project.

Mr. Rhoads, who lives at 120 Osner Dr., N.E., is chief staff engineer at Lockheed's Marietta plant now. He has been with Lockheed since 1941.

He will direct the work of the approximately 500 scientists, engineers and service personnel who will be employed at the Dawsonville site.

perhaps the world's first nuclear aircraft take place at the Dawsonville plant.

LOCKHEED AND the Air Force officially announced Monday night at a dinner at Gainesville that they intend to build a 10,000-acre, multi-million-dollar nuclear aircraft test site just southwest of Dawsonville (population, 350).

And, perhaps as significantly, Lockheed's top Georgia executive hinted that the actual manufacture of a nuclear-powered plane—perhaps the world's first—might take place at Lockheed's Marietta plant.

AND

there's more that can't
be published—yet

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The world's largest integrated aircraft plant, at Marietta, Georgia, — where we build Lockheed C-130 Turbo-Prop Cargo planes and B-47 Jet Bombers—welcomes this new Lockheed program in Georgia.

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This new atomic development and its effect on the adjacent manufacturing plant and new Engineering facility at Marietta, creates far reaching additional opportunities for Engineers and Scientists in a wide range of categories in both places.

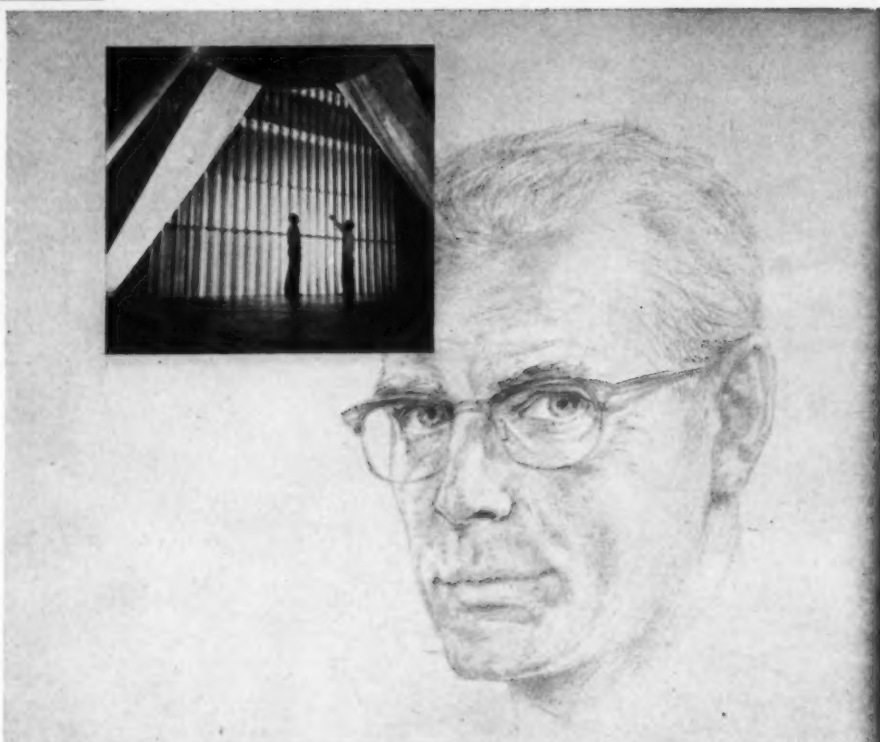
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MODEL 5-986

Federal Electric Gets AF Alaska Network Job

The Air Force has awarded Federal Electric Corp., a subsidiary of the International Telephone and Telegraph Corp., the operation and maintenance contract for the Alaska Integrated Communication Exchange ("White Alice") network, now under construction.

The network will consist of over-the-horizon and line-of-sight microwave radio links connecting defense installations and isolated communities.

The system will complement commercial communications systems serving Alaska.

Federal already is at work on maintaining the DEW line, distant early warning radar network in the far North.

Oops — Sorry!

Salary listing for aviation's top engineers (AMERICAN AVIATION, May 21, p. 97) showed G. S. Trimble, Martin at \$10,000 for the year 1955. This figure represented compensation for the first five months of 1955 only.

Compensation shown for Fairchild engineering personnel reflects the 19-month period from January 1954 through July 31, 1955, not the year 1955 as noted.

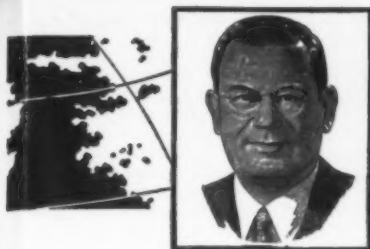
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Airborne Accessories Corporation	45	Hi-Shear Rivet Tool Company, The	12
AiResearch Manufacturing Co., Div. of The Garrett Corp.	51	Hydro-Aire, Inc.	16
American Airlines, Inc.	6	Kaiser Metal Products, Inc.	54
Avro Aircraft Limited	1	Kawneer Company, The,	
B & H Instrument Company, Inc.	53	Aircraft Products Div.	63
Bell Aircraft Corporation	52	Link Aviation, Inc.	10
Belmont Plaza Hotel	25	Lockheed Aircraft Corporation	42
Bendix Aviation Corporation		Lund Aviation, Inc.	62
Bendix Products Division	48, 49	Marquette Metal Products Co.,	
Scintilla Division	18	Div. of Curtiss-Wright Corp.	31
Braniff International Airways, Inc.	50	Minneapolis-Honeywell Regulator Co.,	
Bulletin Board (Classified)	91	Aeronautical Div.	70
Continental Motors Corporation	59	Monsanto Chemical Company	17
CONVAIR—A Division of General Dynamics Corporation	23	D. Napier & Son, Ltd.	68
Employment Section		Patton Mfg. Company, Inc.	57
CONVAIR—A Division of General Dynamics Corporation	90	Pratt & Whitney Aircraft Div.,	
Lockheed Aircraft Corporation	89	United Aircraft Corp.	5
McDonnell Aircraft Corporation	88	Purolator Products, Inc.	66
Esso Standard Oil Company	73	Reading Aviation Service, Inc.	4
Fairchild Engine & Airplane Corporation	95	Rheem Mfg. Company,	
Flightex Fabrics, Inc.	62	Government Products Division	79
Ford Instrument Company, Div. of The Sperry Rand Corp.	38	Rolls-Royce, Limited	57
General Electric Company	20, 21	Rotol Limited	55
General Mills, Inc.,		Sabin Metal Corporation	25
Mechanical Division	56	Scottish Aviation Limited	60
General Precision Equipment Corporation	8, 9	Solar Aircraft Company	64
B. F. Goodrich Company, The	26	Southwest Automotive Company	61
		Temco Aircraft Corporation	13
		Texas Company, The	96
		United Air Lines, Inc.	36
		Vertol Aircraft Corporation	83
		Vickers-Armstrongs (Aircraft) Ltd.	35
		Western Air Lines, Inc.	33
		Wm. R. Whittaker Company	24
		Wilcox Electric Company	2

SUMMARY OF U. S. LOCAL SERVICE AIRLINE TRAFFIC FOR MARCH, 1956

(Compiled by American Aviation Publications from official CAB data.)

AIRLINES	REVENUE PASSENGERS	REVENUE PASSENGER MILES	AVAILABLE SEAT MILES	PASSENGER LOAD FACTOR	MAIL TON MILES	EXPRESS TON MILES	FREIGHT TON MILES	TOTAL TON MILES	REV. TRAFFIC	AVAILABLE TON MILES FLOWN	% AVAILABLE TON MILES USED	REVENUE PLANE MILES	SCHEDULED MILES	% SCHEDULED MILES COMPLETED
Allegheny#	25,425	4,088,000	9,680,000	42.23	6,812	15,373	2,854	414,934	959,828	44.62	376,218	415,539	89.34	
Bonanza#	10,273	2,187,000	5,271,000	41.49	4,045	3,255	3,689	218,981	548,309	39.94	229,428	222,854	99.43	
Centrale	10,261	1,713,000	4,974,000	34.43	3,854	2,619	5,073	175,090	568,507	30.79	236,878	241,885	97.93	
Frontier	15,907	4,888,000	9,166,000	53.33	22,353	9,971	50,251	549,405	872,907	62.94	436,416	410,362	98.73	
Lake Central#	10,344	1,561,000	4,494,000	34.74	2,175	10,383	...	157,614	461,768	34.13	192,395	206,938	92.47	
Mohawk	24,328	4,355,000	7,773,000	56.02	3,913	7,672	9,784	436,427	777,242	56.15	279,579	289,788	86.27	
N. Centrale	38,457	5,679,000	11,663,000	48.69	18,694	27,641	...	589,845	1,331,036	44.31	553,526	599,903	91.97	
Ozark#	24,483	3,671,000	10,417,000	35.24	9,412	14,819	...	367,528	1,027,153	35.78	416,695	434,182	95.78	
Piedmont	30,909	5,743,000	11,621,000	49.42	14,596	9,953	12,679	586,997	1,184,961	49.54	553,720	562,719	97.84	
Southern	16,140	2,851,000	6,129,000	46.52	8,469	11,767	...	293,343	664,197	44.17	292,705	287,211	99.40	
Southwest#	20,024	4,150,000	8,979,000	46.22	6,403	4,298	10,961	416,824	916,817	45.46	311,169	293,326	99.45	
Trans-Texas	17,718	3,997,000	10,149,000	39.38	13,065	8,240	19,279	421,653	1,159,925	36.35	483,302	499,265	96.71	
West Coast#	17,145	3,088,000	6,811,000	45.34	4,494	2,442	6,445	300,569	553,926	54.26	296,117	299,832	98.74	
TOTALS	261,414	47,971,000	107,127,000	44.78	124,079	128,433	121,215	4,929,210	11,026,556	44.70	4,666,821	4,763,804	95.44	
Helicopter Services														
HAS	...	...	...	...	2,279	...	...	2,279	5,453	41.79	26,831	29,507	90.91
Los Angeles	1,296	62,000	...	...	4,969	1,785	...	11,775	22,580	52.15	44,750	48,348	91.00
N.Y. Airways	2,545	46,000	92,000	50.00	1,003	1,108	431	6,836	12,091	56.54	30,434	42,490	70.91	
* Mail ton-mile figures include non-priority mail carried by air as follows: Allegheny, 320; Bonanza, 1,621; Central, 129; Mohawk, 332; N. Central, 5,913; Ozark, 634; Piedmont, 5,624; Southern, 561; Southwest, 809; Trans-Texas, 2,174; West Coast, 890.														
* Revenue passenger load factor based on 23 seats for Bonanza; 23 seats for Lake Central; 25 seats for Ozark; and 23 seats for West Coast. Allegheny load factor based on 24 seats for DC-3 equipment and 40 seats for M-202 equipment; Southwest load factor based on 31 seats for DC-3 equipment and 36 seats for M-202 equipment.														
NOTE: 1. Above figures include both scheduled and non-scheduled operations.														



EN ROUTE...

WAYNE W. PARRISH

W W P Calls on Lenin and Stalin

I remember my visit to the tombs of Lenin and Stalin in Moscow's Red Square as though it were yesterday.

It was a cold, dark, snowy day late last November. I reported to the Intourist office in the National Hotel at 4:20 p.m. because on this day the big granite and marble mausoleum was opening at 4:45. (The opening hour is different for every day except Friday when the tombs are closed).

Long before my reporting hour the customary two-abreast line of black figures began forming in the snow below the Kremlin wall opposite my hotel. Every day I had watched that long line of pilgrims take form and wait for hours in order to pay their respects to the two departed leaders. The line never seemed to be less than a quarter mile long and often longer. Where they came from I'll never know, but every visitor to Moscow feels it to be a binding duty to visit the mausoleum.

Intourist, however, as in almost everything else, cuts the red tape for its guests. I was to be taken up near the head of the line just before the opening. Much as I wanted to see Lenin and Stalin, I don't think I could have stood the long wait in the bitter cold by following the mass procedures.

A girl interpreter I had not seen before, who spoke excellent English, was waiting for me. I found that she was also shepherding two Czechs and three Red Chinese, so the six of us started the trek around the square in front of my hotel until we reached the head of the long line which snaked back from the entrance to Red Square.

On the way over I noted with no small interest that the interpreter kept closest watch on me to see that I wasn't going astray. She gave secondary attention to the two Czechs, and left the three Chinese to shift by themselves. I wouldn't say she was rude to them but she didn't seem to care whether they kept up with her or not. They were dressed better than the average Russian.

At the front of the line we joined other Intourist groups but I didn't recognize any westerners. I stood next to one of the Chinese, and right in back of the Czechs. I was, in fact, No. 6 from the front. Back of me stretched bundled-up people for at least a quarter of a mile and probably farther. In Red Square itself the plows were cleaning off the most recent snow.

A Natural Mistake

Having nothing to do but try to keep warm, and having recognized the Czech accent of the man in front of me I said in English, "You're Czech, aren't you?" He turned around with a broad smile and replied in the affirmative in English and asked if I were

American or English and I replied that I was an American. He put out his hand to shake mine and said "I'm so happy to see you here in Moscow."

I'm certain that he thought I was a visiting Commie paying my respects to the departed leaders. Under normal circumstances old Pappy Parrish would have made it most awfully clear that he wasn't a Commie or anything like one, but my desire to visit the mausoleum without any untoward incident overcame the brush to my pride. Anyway I was outnumbered 5,000 to one and there are limits to making a stand on mere principle in the snow of Red Square.

Shortly after 4:30, the guards at the head of our line gave a signal to proceed. By proceed I mean we shuffled as in a funeral procession. To say that I felt foolish inching along across Red Square in a procession of Reds from all over a fair slice of the world puts it mildly. One minute I wished all my friends could see me, the next I hoped to heaven I didn't run into anybody I knew.

It was now dark. The flood lighting for the Kremlin wall had come on. So had the battery of spotlights on top of the Gum department store opposite the mausoleum. Weird St. Basil's with its candy-stick spires loomed up ahead. Along the side of Red Square adjacent to the department store the evening traffic was flowing. It all seemed so utterly unreal.

Inch by inch our line moved out toward the center of Red Square and then made a sharp right turn directly toward the main entrance of the mausoleum. Then we stopped and waited. At 4:45 p.m. the chimes rang in the Kremlin clock tower and as the last note sounded the big doors of the mausoleum swung open and our procession moved slowly in between well-groomed armed sentries standing at attention.

As we entered we took off our hats and for a moment I was in a panic. My glasses suddenly steamed up so I couldn't see. I had to hold my hat, dig out a handkerchief from my back pocket, wipe my glasses, blow my nose, and keep from stumbling down the six steps to the first level. All the time I was afraid I'd be missing something.

From the first level we turned left down some more steps, then right down quite a few more, then two quick rights and we came up alongside the tomb of Lenin. Beside him was Stalin. They were both within a large glass enclosure.

The lights were dim but there was a soft glow over the two bodies, a sort of warm spotlight effect focussed on the faces. It was theatrical in a highly professional manner.

I took a good look at Lenin while walking slowly by and around the foot of his body. I'm afraid he ain't too

much longer for the public view; at least that's my impression. There was a wide black ribbon band around the back of his head, which I suspect indicates deterioration. His face was quite thin and I swear I noted some frost on his mustache. (There has been speculation that the bodies are refrigerated). But since Lenin died in 1924, they've done quite a remarkable job of keeping up his appearance and grooming all this time.

Stalin Looks Healthy

Then came Stalin and I must say he looked most awful healthy. Too healthy for comfort. He was so lifelike I wouldn't have been surprised if he had sat up and started talking. His hair and mustache were perfectly groomed.

And then, like a fast anticlimax, it was all over. Our procession moved right out onto Red Square. The build-up and atmosphere of religion, adulation and suspense had been terrific. It was one of the most remarkable experiences I've ever had. I wouldn't have missed it for anything. But it was also depressing to ponder the gruesome nature of this six-day-a-week combination show and worship. It is a strange, macabre phenomenon of today's materialistic world.

Our girl interpreter was waiting for me and my Czech and Chinese companions and insisted we walk through the garden at the base of the Kremlin wall where a lot of Commie heroes from around the world are either buried or honored. The snow-covered evergreens were beautiful in the floodlights.

My Czech friends seemed somewhat perplexed at my lack of interest in the names of some of the Commies but I didn't recognize any of them who were supposed to be Americans except two birds by the names of Reed and Haywood. And even then I wouldn't go so far as to say they were speaking acquaintances. What in the world are they doing over there, anyway?

Our party then broke up. I walked back to the National with the interpreter, a very friendly gal, who remarked that she listens a lot to the British and other European radio stations but wished she could get New York more often. She said the New York signals are too weak.

Not Long for This World?

How long Lenin and Stalin will remain on view is highly debatable. But I'd recommend that you not delay if you want to see them. I suspect somebody, soon, will dig up a fine excuse to move Stalin down to his home area of Georgia in the Caucasus "by public demand" and if you want a cozy little inside tip from me—I'm no undertaker or embalmer—but I just don't think ol' Lenin can hold out too much longer.

And now, if you're still with me, let's visit the much-publicized Moscow University, another showplace on the primary tourist beat. It's in a 32-story building on the outskirts of the city, surrounded by some smaller buildings. Approaching from town, it's as impressive as any ornate skyscraper.

Forgive me if I wasn't much impressed. Maybe it was because my interpreter for this trip was Ludmilla, a smart, alert little gal with quite a bit of personality and some clothes and jewelry that certainly didn't come from Moscow. Perhaps I shouldn't write about these things but Intourist should know about it. The truth is that when Ludmilla checked her coat at the university she, well, let's say it—she smelled. She stank awful. I don't think she had washed under her arms since before World War II. I stood it as long as I could and then cut short our visit when it came time to go up an elevator to an upper floor. They just don't make elevators big enough for the two of us when it was necessary to be ten feet ahead of Ludmilla to get a breath of fresh air.

Impractical Building

So I confess right off that I had it in for the university and all the U.S.S.R. from the time we checked our coats. But discounting the personal angle, I still think that the big 32-story building was 90% fluff and 10% university. It is very poorly planned from a functional standpoint. It has marble in all the wrong places and wooden floors (rapidly wearing down) in all the wrong places and the elevators are too few and too slow for such a big building and the hallways are poorly lighted and, to put it short, I thought it was quite a sham from the standpoint of sound planning. It's all gaudy exterior showplace but not utilitarian. It's only three years old but already shows undue age.

Ludmilla told me there are 23,000 students but she did admit that a lot of these attend classes downtown. I was glad of that admission because I know enough about buildings to know that 23,000 people couldn't use that one building; or anything like that figure. I saw one of the two dining rooms and I did some quick calculating and I'll be blasted if I believe one solitary figure I heard about the number of students living and attending classes there. The dining room capacity wouldn't match that of one of our smallest colleges in a small town.

I could be wrong as rain and I have no doubt I'll be challenged but let's face it. My personal view is that it is just a big high school and about on that level of education. I saw some of the "students" and it was the strangest lot I ever did see. I visited one or two dormitory floors and looked at typical rooms and they weren't bad, but there are three kitchens on each floor for the students to cook their own meals but they didn't look as though they're used much.

One guy who must have been 40 if he was a day old was frying fish and between the fish smell and Ludmilla I really thought I had had it. There are some nice reading and study rooms and there is supposed to be a vast library with 5 million books but the whole thing looked awful exaggerated to me. I've been on a lot of college and university campuses and I don't care how

serious these folks may be at Moscow University but I just couldn't get excited. It ain't what you call it, it's what it is that counts.

And then I went on a tour that Intourist didn't take me on. Col. Charles Taylor, the U.S. air attaché in Moscow, and a very swell guy, asked me if I'd like to go for a ride. I sure did. So one very cold afternoon we drove in his old battered Chevrolet to the aviation museum, a public place but which few westerners ever see because I sort of gathered it isn't exactly on the priority list for tourists. When we arrived they were getting ready for a lecture of some sort and we didn't seem to be too welcome.

The museum is in an old building out in a nondescript part of town. It isn't very big, but the displays are arranged chronologically. It starts, of course, with some drawings and descriptions of the first airplane which, please understand, wasn't invented by the

En Route to Be Available In Booklet Form

The series of En Route articles by Wayne W. Parrish on his trip to the Soviet Union will be reprinted in booklet form when the series is completed in July. Price will be \$1.00 each. Quantity discounts on request. Publication date is August 1.

Wright brothers in the U.S. in 1903, but by a Russian in 1890. His name escapes me, just as it does the historians. I couldn't read the Russian signs, but we followed along through the development of Russian aircraft and inventors on up to the present.

Believe it or not, there is a full, complete, Mig-15 sitting there on the floor. In person, not a film. It's an old model and shows some wear. I remember the desperation of the USAF in trying to get hold of a Mig-15 during the Korean war, when here in a public museum in Moscow is one on full display. It's the only complete airplane in the place.

There is a powerplant hall with old types of engines, including two early jet engines of which one is a coaxial. Both are cutaways and not in very good condition. There is also a rocket engine which seems pretty crude and obviously of early design. All of the exhibits are accompanied by charts and graphs and other descriptive matter. In the main hall is a small working model of a jet.

In one room Col. Taylor showed particular interest. The last time he had been there, there was a germ warfare exhibit, definitely anti-U.S., trying to pin germ warfare on the Americans in Korea and China. But it was gone, all except some color photo plates showing enlargements of alleged germs. The illuminating lights were off and all descriptive matter was gone.

Civil Defense Exhibit

Upstairs there was an extensive civil defense exhibit, quite detailed, showing how to protect oneself against atomic raids, how to de-contaminate,

how to perform first aid, and so forth. There were several poison gas tanks with a sign saying these were types "being produced in the U.S." While we were looking around a woman guide was taking about 20 teenagers through. Col. Taylor said she carefully avoided mentioning the U.S. in her lecturing at least while we were within hearing.

In another room there was a display of various drawings of guided missiles, including the Martin Matador, the Regulus and Corporal, but they seemed to have been made some time ago. There were photos of the B-52 and B-47 with figures which, surprisingly enough considering Soviet intelligence, were far off the beam. Far short of reality, shall we say. The B-47 photo was actually an old photo of the XB-47. Insignia of other nations in the various displays were U.S., Great Britain, France and Turkey, all, presumably, enemies of the U.S.S.R. It is obvious that an awful lot of school kids are taken on guided tours through the air museum. It is, on the other hand, one of the least pretentious and least spruced-up public places in the city, and not one of the displays seemed to be new.

On our drive we passed the Central Airport, located close in, where government officials and important VIPs from abroad arrive and depart. It is not a public airport and there are no regular operations. Alongside the field is quite a large factory producing medium bombers. But no airplanes were in sight. Farther out we passed the airport where the Red Air Force has its annual show. There were three Russian-built DC-3 types belonging to the Air Force parked in the snow, with no activity in evidence anywhere. There is a factory producing Bisons within the city limits, also, but the casual visitor is not likely to spot any airplanes either in the air or on the ground.

One evening I was taken by Mr. Hodorkov, chief English interpreter for Intourist, to the puppet show. It was well worth the visit even though I couldn't understand what was being said. Luckily for me it was a variety show, quite popular in Russia, and a skilled and highly professional performance. One scene had a choir of 63 puppets, a truly remarkable feat. Another had lion-tamers and the like. There was a lot of humor in the show, judging from the laughter of those who understood the language, but there were more non-Russians in the audience than at any other performance I attended. If you're in Moscow, put the puppet show down as a good evening's entertainment.

(To be Continued)

Ornate Moscow University, one of about five skyscraper structures in Moscow, the others being apartment buildings.



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